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IRRADIATION CATARACT

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Introduction

IT has been known for many years that the lens of the eye undergoes chemical and physical changes as a result of the passage through it of spectral rays. These changes become visible as cataract.

Cases of cataract due to exposure of the lens to infra-red rays have frequently been reported, and have occurred, industrially, in glass-workers, iron-workers, tin-workers, and chain-workers. The question was deliberated by the Cataract Commission in 1928, and the lens changes were attributed to heat rays.

Lens opacities following exposure of the eye to ultra-violet light are very rare, but cases have been reported.

Cataract following radium and deep X-ray therapy, if applied near the eye, has also been recorded, but has not received the attention it deserves. In recent years radium has been used much more extensively as a therapeutic agent, and deep X-rays are frequently employed in the treatment of pituitary tumours, or in neoplasms of the nose and accessory sinuses. In this deep X-ray therapy a large quantity of rays passes directly through the eyes.

This paper is devoted to a consideration of cataract caused by radium and X-rays. Infra-red and ultra-violet ray cataract will not be discussed.

History and Literature

X-ray cataract.—X-rays were discovered in 1895, and since then various investigators have produced lens changes in rabbits by exposing the eyes to these rays.

Clapp,[1] in a recent paper, gives a list of references of such experiments, and no further mention of them is necessary here, except to record that the site of the opacities was the posterior cortex of the lens, and that the latent period varied between 165 and 325 days in one series (Peters).

Recorded cases of X-ray cataract in man are uncommon. The first case reported in English literature was that of Paton,[2] in 1908. Paton's case was a woman, aged 32 years, who had lupus of the cheeks treated by X-ray therapy. Her sight began to fail nine months later, and two years after treatment the sight of one eye was very much affected.

In 1911 Stock[3] reported the case of a woman prematurely delivered of triplets as a result of X-rays; the lens of each foetus showed cortical changes.

Jess,[4] in 1929, recorded two cases. One had deep X-ray treatment for a nasopharyngeal tumour, and the other for a pituitary tumour. In both cases the cataract was post-cortical, and was discovered more than three years after treatment.

In 1931 Foster Moore[5] read a paper before the Ophthalmological Society, in which he described X-ray cataract occurring in a young man who was the subject of sycosis of the face and scalp. For this disease he had received, as treatment, a dosage of 12 Sabouraud units in five months. Two years later the sight began to fail. Both eyes were involved. Foster Moore stresses the site of the changes, which appeared in the lens substance, close to the posterior capsule. After removal of the lens by discission, the original pattern of the opacity was outlined on the posterior capsule. A drawing of this cataract is shown in Fig. 1.

In the discussion following this paper, Mayou said he had shown a case of exophthalmic goitre to the Society a few years previously, and this case had developed cataract following X-ray treatment for the goitre. Mayou also pointed out that in the early days of X-rays many operators had been exposed to the rays each day; some developed telangiectases on the skin, and others got cataract. Mayou suggested, as a cause of the cataract, that the cells lining the anterior lens capsule were killed by the rays. In the same discussion, Treacher Collins said that two years previously he had brought to a meeting of the Society Dr. Critchley,

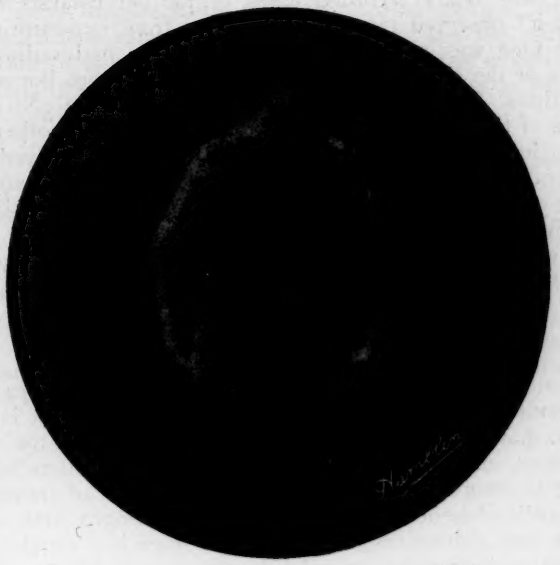


FIG. 1.

an X-ray worker. Dr. Critchley had developed post-polar cataract. Collins mentioned Erggelet,[6] who reported several such cataracts in X-ray workers.

Other observers have recorded cases, and for a full reference the reader should consult Clapp's paper.[7]

Radium cataract.—Experimenters have succeeded in producing cataract in rabbits by exposure to radium. In a series of investigations by Peters, quoted by Clapp,[8] the dose varied between 160 and 640 milligram hours, and the latent period between 90 and 260 days.

Some observers claimed to disperse lens opacities by radium treatment. Franklin and Cordes[9] treated 31 cases with incipient cataract by radium in amounts varying from 25 to 200 milligram hours; they claimed that 84·3 per cent. were improved. S. Withers,[10] in reviewing the indications for radiation therapy in ophthalmology, quotes Cohen and Levine who stated that in incipient cataract, lens opacities may diminish under the influence of radium. I think ophthalmologists are agreed that lens changes result from irreversible chemical changes, and I do not believe that radium, or any other agent, can have any permanent beneficial effect upon these chemical reactions.

There are many recorded cases of radium cataract in man. Robinson[11] observed two cases resulting from exposure to large doses. One was a girl, aged 6 years, who had radium for a sarcoma of the lid. The dose was 3,000 milligram hours in two applications. Three years after, the lens was opaque. No mention is made of the type of opacity which resulted. The other case is less conclusive. A middle-aged, diabetic woman received radium treatment for a rodent ulcer of the lid. Cataract appeared later, but the author admits that the lens changes may have been due to conditions resulting from diabetes.

Blegvad[12] reported four cases, and de Schweinitz[13] three. In one of the latter, the opacities were beneath the anterior capsule.

Morphology and Pathology

Cause.—The exact process whereby the lens undergoes changes as a result of irradiation has not been determined. It is agreed, I think, that the opacities are due to a disturbance of the nutrition of the lens, and, as a result of this, chemical reactions take place leading to coagulation of lens proteins and loss of transparency.

Desjardins[14] believes that degenerative changes first affect the anterior lens epithelium, and that later there is a development of vacuoles and granular material in the deeper layers. Mayou's view is similar.

Stallard[15] suggests that the defective nutrition of the lens is dependent upon damage of the capillaries of the ciliary body; there is vasodilatation and hyaline degeneration in neighbouring tissues, and the cells of Rouget in the capillary walls become paralysed.

I agree with Stallard's suggestion, and such changes in the capillaries of the ciliary processes are analogous to those taking place in the skin in the formation of telangiectases. Further, it may be pointed out that there is an individual variation in the effect of X-rays upon the skin. Some people are more likely to develop telangiectases than others, and there seems no reason why a corresponding individual variation of radio-sensitivity of the lens should not be assumed. This would help to explain differences in latent period, slight modifications in the structure of the opacities, and occasional cases of apparent immunity.

Situation and type of opacity.—There is no doubt that the site of election of this form of cataract is the posterior cortex, close to the posterior capsule. Both infra-red and ultra-violet cataracts occur in the same situation. In nearly all cases in the literature, and in all those that I have been able to collect, some of which I have watched from early stages, the posterior cortical region has been primarily affected.

To my mind the appearance of this sort of post-cortical cataract differs, quite definitely, in ophthalmoscopic picture, from that of a post-cortical cataract of other aetiology. For the purposes of description, it is convenient to divide the alterations taking place in the lens into four stages. This division is quite artificial, and stages 1 and 2 are usually seen together.

Stage 1.—The formation of vacuoles.

Stage 2.—The appearance of fine spots and feathery lines between and around the vacuoles. These spots and lines are rather cloudy of outline and difficult to distinguish individually. New vacuoles begin to extend further forward in the lens, and the posterior part of the opacity becomes more cloudy.

Stage 3.—The formation of a central posterior plaque, which is roughly circular in outline. The rim of this plaque is always slightly more dense in appearance than the remainder. The cloudy areas become thicker round the plaque, and the spots, lines, and vacuoles extend forwards and equatorially.

Fig. 2

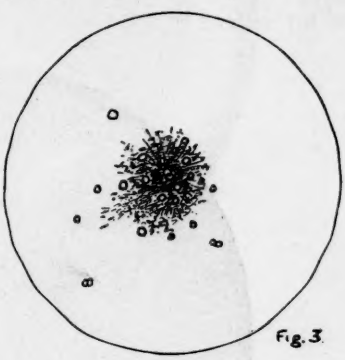


Fig. 3

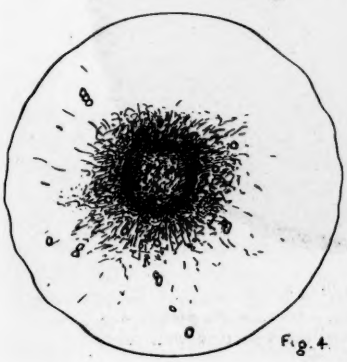


Fig. 4

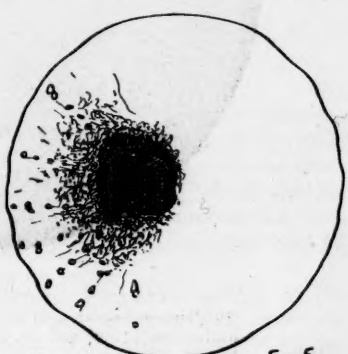


Fig. 5

Stage 4.—The whole lens becomes less transparent, and the distinctions of Stages 1, 2 and 3, less obvious. At this time ordinary senile cortical striae make their appearance in some cases.

I have endeavoured to show the changes, such as I have described, in the figures below.

Fig. 2 shows the first stage with a few post-cortical vacuoles. When examined with a slit-lamp, the vacuoles are found to be not quite circular. This feature was first noticed by Foster Moore.

Fig. 3 shows the spots and cloudy lines, and fresh vacuoles extending towards the equator. I have noticed vacuoles under the anterior capsule at this stage.

Fig. 4 gives an idea of the shape and form of the plaque. Around it the cloudy areas can be seen, and vacuoles and lines are visible coming forward.

Fig. 5 is included to show that the cataract is not always quite central. It also shows the vacuoles extending radially forwards. All the opacities in this case were confined to the inner side of the lens. This drawing was made from the left lens of case 16 of my series; Fig. 2 was from the right lens of the same patient.

FIG. 6.

Slit-lamp appearance of plaque. Actually the plaque was highly refractile, and its crystalline structure well seen, but it is not shown in the figure.

On examination with a slit-lamp, the plaque is found to be highly refractile, and to contain large numbers of crystals. A slit-lamp drawing of a plaque is shown in Fig. 6, which is from the left eye of case 11.

The above description applies to the majority of irradiation cataracts. I am inclined to think that plaque formation is an

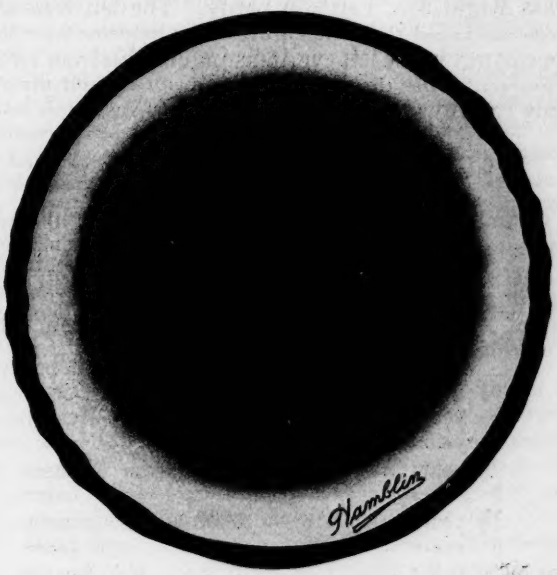


FIG. 7.

An atypical X-ray cataract. The posterior plaque is very irregular in outline, and is lacking a rim. Cloudy areas and vacuoles were present, but are not shown because they were further forward in the lens substance.

earlier phenomenon in X-ray cataract than in radium cataract, unless the dose of the latter is very large. Sometimes the more dense posterior area does not form a typical plaque; instead there is an indefinite pattern. This is shown in Fig. 7, which was an X-ray cataract (case 7). There were some vacuoles in this case, but they are not shown in the figure. The patient was 33 years of age.

Later stages consist in the formation of opaque patches in the anterior parts of the lens. Then the changes described above are masked. These later alterations may occur very rapidly. Case

3 is a good example. This was a woman, aged 52 years, who had a course of deep X-ray therapy from December, 1930 to January, 1931, and a second course from June, 1931 to July, 1931. She was suffering from a myeloma of the left maxilla. In May, 1932, Mr. Rupert Scott made the important note that the media were clear in each eye. I first saw the woman in May, 1933. She then had typical early irradiation cataracts (stage 2), and vision was Right 6/9, Left 6/9 partly. The left cataract was a little more advanced than the right. Five months later there was a mature cataract in the left eye, indistinguishable from an ordinary senile cataract, while the right lens had not altered much. This is the only case I have with such a rapid history.

Latent Period

One of the outstanding features in the study of irradiation cataract, is the length of time which expires between exposure to radiant energy and the formation of cataract.

Clapp, in the paper to which I have already referred, collected 38 cases of irradiation cataract from the literature. The latent period in this group was as follows:—

9½ months	1 case
1 year	1 case
1½ years	1 case
2½ years	2 cases
3 years	3 cases
3½ years	2 cases
5 years	3 cases
6 or more years	5 cases

In the remaining 20 cases the latent period was not stated. Thus, of 18 cases, 16, or 88 per cent., had a latent period of 18 months or longer.

In my series the latent period works out as follows:—

2 years	2 cases
2½ years	2 cases
3 years	2 cases
4 years	3 cases
5 or more years	4 cases

So that, of 13 cases, all had a latent period of at least two years. In some of these I was only able to judge the approximate latent period by finding out the date when the patient first noticed interference with vision. However, the point I wish to establish, is that there is a latent period of at least 18 months or two years

between exposure and cataract formation, and that this period may be considerably longer. The longest record I have is 12 years (case 9).

Analysis of Cases

The total number of patients examined was 36. Several of these had very small applications of radium, but they were investigated with a view to the determination of what might be regarded as a safe dose.

Of my 36 cases, five received both X-ray and radium treatment, eight had X-rays alone, and the remaining 23 had radium alone. In considering the five cases which received both kinds of irradiation, I have regarded four of them as having only had X-rays, for the purposes of this investigation. I have done this because in each of the four, the radium was applied some distance away from the eye, and I do not believe it to have taken any part in the formation of lens opacities. Radium applied in the post-nasal space is too far removed to exert any influence upon the eye.

Therefore, I am regarding my cases as having been exposed to irradiation in the proportion of 12 to X-rays, one to X-rays and radium, and 23 to radium only.

X-rays.—Of the 12 cases, nine developed irradiation cataract. Of the other three, one had treatment as recently as April, 1932, and can, therefore, be considered to be in the latent period (case 1); another developed some lens changes, but as they were not typical I have regarded the case as negative (case 4); while the third case was definitely negative (case 5).

Thus, of 11 cases in which a positive result might be expected, nine, or 81 per cent., developed an irradiation cataract.

Radium.—23 cases were examined altogether, but they received, in the majority, very small doses. Three cases were definitely positive; three others had some post-cortical vacuoles, and 17 were negative. I have excluded the three doubtful cases, they were not convincing. They will be followed up later.

Consideration of Dosage

X-rays.—Before discussing the dosage, we must devote a few words to the method of application of X-rays.

The sort of case with which we shall find ourselves concerned, is, for example, a pituitary tumour, or a neoplasm of the nasal region. X-ray therapy in these cases is applied in a series of daily exposures. One exposure only is given each day, and the rays are focused upon the area to be treated. Each day the rays are "fired" from a different angle, so that the whole region

TABLE OF CASES.

Case Details.				Disease.	Treatment and Dose.	Year Treated.	Lens Change.
1.	J. D.	44	M.	Squamous carc. nose	Deep X-rays 1 course	18/4/32—30/4/32	Nil
2.	L. G.	58	F.	Post-nasal sarcoma	Deep X-rays 1 course	20/10/27—2/11/27	X-ray cataract, right and left
3.	L. B.	52	F.	Myeloma of maxilla	Deep X-rays 2 courses	29/12/30—10/1/31	X-ray cataract, left more advanced
4.	M. T.	48	F.	Carc. left antrum	Radium 1440 mgm. hrs. X-rays 1 course	February, 1929 13/10/31—27/10/31	Classed as negative (atypical)
5.	W. F.	60	M.	? N.G. orbit, right	Deep X-rays 1 course	15/6/28—29/6/28	Nil
6.	A. B.	43	F.	Sarcoma left frontal	Deep X-rays 1 course	20/9/29—2/10/29	X-ray cataract, right and left
7.	A. O.	33	F.	N.G. nose, right side	Deep X-rays a few applications Deep X-rays 1 course	November, 1929 July, 1930	X-ray cataract, right and left
8.	A. M.	19	F.	Post-nasal tumour	Deep X-rays 1 course	18/10/29—6/11/29	X-ray cataract, right more advanced
9.	E. T.	46	F.	Lupus of nose	X-ray treatment	Treatment ended 1921	X-ray cataract, right
10.	W. S.	45	M.	Nasopharyngeal N.G.	Deep X-rays 1 course Radium 1512 mgm. hrs.	1923 August, 1924	Irradiation cataract, right
11.	E. T.	46	F.	Post-nasal sarcoma	Deep X-rays 1 course 1 course Radium 1296 mgm. hrs.	March, 1929 June, 1929 June, 1929	Irradiation cataract, right and left
12.	E. H.	7	M.	Glioma of retina	Radium 2700 mgm. hrs. Deep X-rays 1 course	1931 June, 1931	Irradiation cataract
13.	R. S.	67	M.	Epithelioma right cheek	Deep X-rays 1 course Radium 3432 mgm. hrs.	3/2/28—16/2/28 May and June, 1928	Irridiation cataract, right and left
14.	A. M.	80	F.	Rodent ulcer lid, left	Radium 2956 mch. hrs.	May, 1932	Opacities, atypical
15.	O. W.	36	F.	Angioma of retina	Radium 480 mch. hrs.	1932	Nil
16.	A. W.	56	M.	Rodent ulcer inner canthi, right and left	Radium 14380 mgm. hrs.	1926, 1927, 1928, 1930	Radium cataract left more advanced
17.	J. M.	67	M.	Rodent ulcer lid, left	Radium 624 mgm. hrs.	April, 1928	Radium cataract
18.	J. K.	53	M.	Rodent ulcer canthus	Radium 1188 mgm. hrs.	April, 1929	Radium cataract
19.	P. B.	60	M.	Melanoma limbus	Radium 41·6 mgm. hrs.	1929, 1932	Few vacuoles
20.	J. H.	11	F.	Spring catarrh	Radium 4·7 mgm. hrs.	1931, 1932	Nil

TABLE OF CASES—*continued.*

TABLE OF CASES—*continued*.

Case Details.				Disease.	Treatment and Dose.	Year Treated.	Lens Change.
21.	H. G.	64	M.	Epithelioma conj., left	Radium 50 mgm. hrs.	1929, 1930, 1931	Nil
22.	J. S.	9	M.	Spring catarrh	Radium 7·3 mgm. hrs.	1931, 1932, 1933	Nil
23.	M. S.	63	F.	Mooren's ulcer, left	Radium 8·3 mgm. hrs.	1930	Nil
24.	M. W.	60	F.	Rodent ulcer canthus	Radium 9 mgm. hrs.	1930	Nil
25.	T. W.	10	M.	Spring catarrh	Radium 10·5 mgm. hrs.	1930, 1931	Nil
26.	E. T.	58	M.	Rodent ulcer inner canthus, right	Radium 2488 mch. hrs. 259 mch. hrs.	1931 1932	Post-cortical vacuoles
27.	H. N.	76	M.	Rodent ulcer face	Radium 200 mgm. hrs.	1930, 1931, 1932	Nil
28	E. B.	57	M.	Rodent ulcer lid, right	Radium 36 mgm. hrs.	1932	Nil
29.	C. A.	62	M.	Rodent ulcer face, right	Radium 150 mgm. hrs.	1931, 1932	Nil
30.	M. C.	67	F.	Rodent ulcer canthus, left	Radium 1128 mgm. hrs.	1931	Nil
31.	M. R.	56	M.	Rodent ulcer canthus left	Radium 60 mgm. hrs.	September, 1932	Nil
32.	M. S.	66	F.	Rodent ulcer face	Radium 97 mgm. hrs.	1931	Nil
33.	A. O.	55	F.	Rodent ulcer lid, left	Radium 33 mgm. hrs.	June, 1932	Senile cataract
34.	J. K.	43	M.	Rodent ulcer face	Radium 35 mgm. hrs.	1931	Nil
35.	R. N.	3	M.	Naevus outer canthus	Radium 25 mgm. hrs.	1930	Nil
36.	N. P.	42	F.	Rodent ulcer lid, left	Radium 376 mgm. hrs.	1930	Nil

NOTES ON THE CASES.

Cases 1, 14, 15, 28, 31 and 33 are still within the latent period. They will be followed up. Cases 4, 14, 19 and 26, although showing post-cortical lens changes, have been classed as negative because they are atypical. Of them, I believe Case 26 will prove to be an irradiation cataract at a later date.

The three positive radium cataracts appeared in Cases 16, 17 and 18. Case 16 was treated by radium needles and seeds. There was a large area of disease involving the bridge of the nose. Cases 17 and 18 were treated by radium needles applied to the lids and left *in situ* for ten days. Case 17 developed telangiectases of the skin of the lids.

The average age of the positive cases in the above series is 45½ years. The eldest was 67, and the youngest 7 years old. Seven patients were females, and six males.

I have included in my list of irradiation cataracts, no case that I was not satisfied that I could exclude from the category of "senile cataract."

involved is subjected to irradiation from all directions. There are usually six points from which the rays are "fired," and each point is used twice. Thus a course of deep X-ray therapy means 12 exposures, and it lasts a fortnight.

To give an example, case 2 was a woman who had a sarcoma of the post-nasal space. She had a course of deep X-rays from October 20, 1927 to November 2, 1927. The applications were as follows:—

1. Right lateral vertical.
2. Left anterior oblique.
3. Left posterior oblique.
4. Right anterior oblique.
5. Right posterior oblique.
6. Left lateral vertical.

And then this was repeated.

In the above course of treatment, the rays pass directly through the eyes in the left and right anterior oblique positions; some rays reach the eyes from the lateral vertical positions; rays from the posterior positions probably do not affect the eyes at all. From this it is obvious that a considerable quantity of rays pass through each eye in one course of treatment. It should be mentioned that the left eye is screened when the right anterior oblique position is used, and *vice versa*.

In this series of cases, seven of the nine patients who developed cataract received only one course of deep X-rays. One of the others had a few extra applications only, while the other one had a full second course six months after the first. The patients who did not develop cataract each had one course.

It is quite clear that one course of deep X-ray therapy is sufficient to produce an irradiation cataract, in fact it is more than likely to do so.

Radium.—I examined 23 cases, but, as I have explained, most of these had very small doses, and the positive cases are too few to be of any statistical value.

Positive results were found in three patients. The amount of radium used in the treatment of each was:—

Case 16. 14,380 mgm. hrs.
Case 17. 624 mgm. hrs.
Case 18. 1,188 mgm. hrs.

Three cases were doubtful, that is to say lens opacities were present, but were not typical. These have been excluded.

There remain 17 cases in which the lens was clear (except case 33, in which there was senile cortical cataract), and the dosage varied from a maximum of 1,128 to a minimum of 4·7 milligram hours. I should mention that the patient who had 1,128 mgm. hrs. (case 30), was treated by radon seeds, some of which were applied at the border of the nose, and these probably had no effect on the

eye, so that the maximum ineffective dose is very likely not so high as I have made it.

Fourteen of the 17 cases were treated by unscreened radiation, that is to say the active rays were of the beta type. The three cases in which cataract developed were exposed to gamma radiation.

I do not propose to say much more about radium cataract until I have been able to collect some more positive results, but one or two points arise from the study of my cases.

First, as small a dose as 624 mgm. hrs. was enough to produce a cataract in one case. Secondly, no case treated by beta radiation developed cataract, and thirdly, radon seeds are probably less likely to cause damage than radium needles. The strongest seed is not effective outside an area of 8 mm., so that if seeds are used more than a centimetre away from the lens the latter will not be affected.

The results of treatment of rodent ulcers in the region of the eye were very good in those cases that I saw at the Radium Institute. In these cases radium is used unscreened. This means that several short applications of radium are given, the effective rays being of the beta variety. When gamma rays are used, the application must be of much longer duration, and in this form of treatment screened radium is employed, the beta rays being screened off.

This seems to me to be very important in the consideration of the best method of treating, for example, a rodent ulcer of the lid. The surgeon should be guided by the knowledge that beta radiation is effective, and safe to the lens, and should use this form of radium therapy if it is practicable. If it is decided that beta radiation is not suitable, it would be wise to consider the possibility of surgical interference, especially if the only alternative is large doses of gamma radiation. Of course, if the growth is large and spreading, the curing of it is obviously more important than the prevention of cataract. But I believe we have been inclined to neglect the damaging effect of radium, in some cases, and have employed large doses of gamma radiation, with such sequelae as malformations of the lid, chronic conjunctivitis, etc., when just as good a result, without sequelae, could have been obtained by the use of smaller doses of beta radiation.

There remains for discussion case 12, which had both X-ray and radium treatment. It was a case of glioma of the retina treated by radium intra-ocularly, and it has been fully reported by Foster Moore, Stallard and Milner.[16] One course of deep X-ray therapy was also given, and it is not possible to say whether one method of radiation was more responsible than the other for the cataract which developed.

Protection

In view of the fact that one course of deep X-rays is sufficient to produce cataract, the problem of protecting the eyes during such treatment is a very important one. I have already mentioned that the eye on the side opposite to that from which the rays are coming is screened. But the eye on the same side is exposed to the full activity of the rays, and this occurs, as we have seen, to each eye twice. I am told that it is not possible to protect the ipsilateral eye, because, if it were screened, even by a very small filter, the barrage effect of the radiation would be interfered with, and treatment thus inefficient. Further, the eye is exposed to a "scatter" of rays, which means that some of them are deflected back from the orbital tissues. It is, however, to be hoped that a method of applying X-rays will be evolved, in which both eyes can be protected without interfering with the efficacy of treatment.

With regard to radium, the point is again stressed that beta radiation should be used when possible. If gamma radiation is used, protection does not seem to be feasible. It would entail wearing a sort of metal contact glass for about 10 days, and this would not be tolerated, apart from the difficulty of keeping it in place.

Conclusions

Exposure of the eyes to the effects of X-rays or radium is likely to result in the formation of cataract.

This cataract has a typical appearance, its characteristics being the formation of vacuoles, cloudy areas, and later a plaque. It also has a constant situation—the posterior cortex of the lens.

There is always a latent period between exposure and cataract formation, and this can be said to be at least two years. It may be many years.

One course of deep X-rays is sufficient to cause cataract. Too few cases of cataract due to radium have been seen to dogmatise, but it may be said (1) that beta rays, applied at short intervals for short periods, are effective in treatment, and harmless to the lens; (2) that gamma radiation is likely to produce cataract.

Protection of the eyes during treatment is impracticable, but efforts should be made to devise some method of screening the lens without jeopardizing the effect of the radiation.

Finally, I wish to record my thanks to Mr. R. Foster Moore for his very valuable help and advice, and for permission to reproduce Fig. 1; to Mr. Rupert Scott for allowing me to investigate three of his cases at St. Bartholomew's Hospital; to Dr. Durden

Smith for arranging for me to see several cases under his care at the Radium Institute, and for details of these; and to Mr. Ralph Phillips for referring cases from the Deep X-ray Department at St. Bartholomew's Hospital to me, and for his valuable technical advice.

REFERENCES

1. Clapp.—*Amer. Jl. of Ophthal.*, Vol. XV, No. 11, Nov., 1932.
2. Paton —*Trans. Ophthal. Soc. U.K.*. Vol. XXIX, p 37, 1909.
3. Stock.—*Klin. Monatsbl. f. Augenheilk.*, Vol. XLIX, p. 93, 1911.
4. Jess.—*Ann. d'Ocul.*, Vol. CLXVI, p. 165, 1929.
5. Foster Moore.—*Proc. Roy. Soc. Med.*, Vol. XXIV, p. 32, 1931.
6. Erggelet.—*Zeitschr. f. Augenheilk.*, Vol. LXIV, p. 161, 1928.
7. Clapp.—*Loc. cit.*
8. Clapp.—*Loc. cit.*
9. Franklin and Cordes.—*Amer. Jl. of Ophthal.*, Vol. III, p. 643, 1920.
10. Withers.—*Amer. Jl. of Ophthal.*, Vol. VII, p. 513, 1924.
11. Robinson.—*Arch. of Ophthal.*, Vol. LV, p. 335, 1926.
12. Blegvad.—*Acta Ophthal.*, Vol. IX, p. 32, 1931.
13. de Schweinitz.—*Bull. of O. O. R. L. Soc.*, Kansas City, Mo., Vol. II, No. 4, 1931.
14. Desjardins.—*Amer. Jl. of Roentgen.*, Vol. XXVI, p. 787, 1931.
15. Stallard.—*Proc. Roy. Soc. Med.*, Vol. XXVI, p. 59, 1933.
16. Foster Moore, Stallard and Milner.—*Brit. Jl. of Ophthal.*, Vol. XVI, p. 673, 1931.

SOME REMARKS ON PILOCARPINE

BY

J. A. VAN HEUVEN, M.D.

UTRECHT

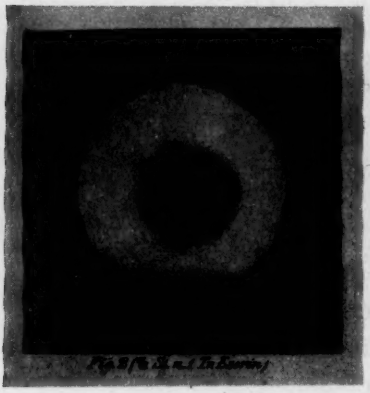
OCCASIONALLY one meets a patient suffering from chronic glaucoma, who is treated with instillation of drops of pilocarpine and complains after this of a bad and diminishing vision. Now in these cases we nearly always deal with elderly people suffering frequently from incipient opacities of the lens. More or less subconsciously, I always considered these complaints to be caused by the narrowing of the pupil. About two years ago I saw shortly after each other two very intelligent patients suffering from chronic glaucoma, who both told me very definitely that their visual acuity was lowered a good deal for one to one and a half hours after the instillation of a 2 per cent. solution of pilocarpine.

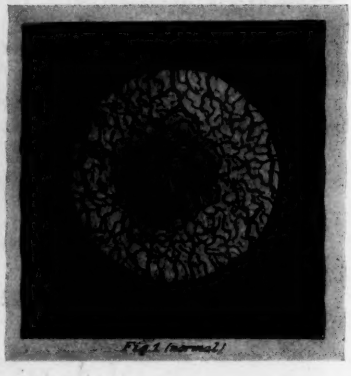
Controlling this statement it appeared that indeed the vision was decreased from one-third to one-fourth of what it was before, about a quarter of an hour after the instillation of 2 per cent. pilocarpine solution in the conjunctival sac. It took one and a quarter to one and a half hours before it was normal again. In

both cases there was not the slightest opacity in the centre of the lens, and in both pilocarpine did its work beautifully, as with the aid of it their intra-ocular tension become normal.

Discussing this phenomenon with him, Professor Weve showed me a paper of C. Hess,* containing a very good description of this phenomenon.

Hess found that after putting one drop of 2 per cent. solution of pilocarpine or eserine in his own conjunctival sac his vision decreased from one-third to one-half. This lasted for one to two hours. At the centre of clearest vision a greyish yellow spot appeared. On looking at the sky he saw centrally a number of





dark spots partially joining each other. On looking in the dark the first moment the same figure was seen bright on the dark background. When the picture formed by the vessels of the fundus was made visible by moving a stenopaeic slit in front of the pupil, it was evident that, about 12-15 minutes after the instillation of pilocarpine, the circumfoveal capillaries became less clearly visible and that a little later they disappeared totally.

In the region of the foveal "chagrin" a compact mass of small dark globules was seen. After one and a half to two hours the normal entoptic picture came back almost suddenly.

On using a 1 per cent. solution the phenomenon appeared later and lasted shorter, on using a 0·5 solution nothing was seen. Instillation of a 1 per cent. solution of homatropine about one to two hours previously inhibited the phenomenon. In trying to explain this phenomenon, Hess excluded the influence of the width of the pupil and that of a temporary rise of the tension. He

* *Arch. f. Augenheilk.*, Bd. 86, Heft 1/2, pp. 89-98,1920.

considers it to be due to a direct action of pilocarpine on the middle layers of the retina. This may either be a spasm of the capillaries or an opacity in the retina. In Hess's paper the following pictures are found illustrating his sensations.

I have looked at this problem from various angles. First every patient using pilocarpine was regularly asked about his subjective sensations after the instillation of it. The quite typical complaints of this relative central scotoma can be easily differentiated from the vast number of ordinary complaints. In the course of one and a half years I was fortunate enough to find four typical cases which showed objectively a relative central scotoma after the instillation of pilocarpine.

Case 1.—A man, aged 53 years, glaucoma simplex, O.D.S. Tension varies after instillations of 2 per cent. pilocarpine thrice daily between 25-30 mm. Hg (Bailliart). V.O.D.S. 6/6, after correction of the small amount of hypermetropia. 15-20 minutes after instillation of pilocarpine the vision is decreased to 6/18 in each eye. One and a half hours later everything is normal again.

Case 2.—A man, aged 57 years. O.D. anophthalmos, O.S. glaucoma simplex. Instillations of 2 per cent. pilocarpine four times daily keep the tension of the left eye about normal.

V.O.S. is 6/12. Some very small opacities in the periphery of the lens. One single posterior synechia. A quarter of an hour after pilocarpine the vision is lowered to 6/24, an hour later it is normal again.

Case 3.—A man, aged 62 years. O.D.S. glaucoma simplex. V.O.D. 6/36, V.O.S. 6/6 after correction of the hypermetropia. Pilocarpine given to the left eye causes a decrease in the vision to 6/18; not before one and a half hours afterwards is the vision normal again.

Case 4.—A woman, aged 61 years. O.D.S. glaucoma simplex. In the right eye there is only an eccentric vision of 1/60, in the left eye after correction of the hypermetropia the vision is 6/8, after pilocarpine 6/24, one to one and a half hours later 6/8 again.

These four patients agree in this respect that they all are above 50 years of age, and I may add at once that during two and a half years of my observation of this phenomenon, I have never seen a young person showing this relative central scotoma after pilocarpine. Possibly this could also be explained by the fact that in young people the use of pilocarpine is very seldom necessary.

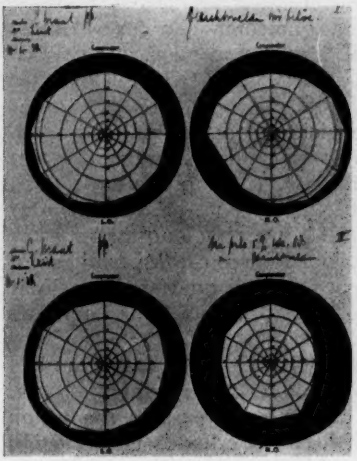
I instilled in the conjunctiva of 30 students from 20-30 years of age drops of solutions varying from 2 to 6 per cent. of pilocarpine. The slightest sensation of a relative central scotoma was never found.

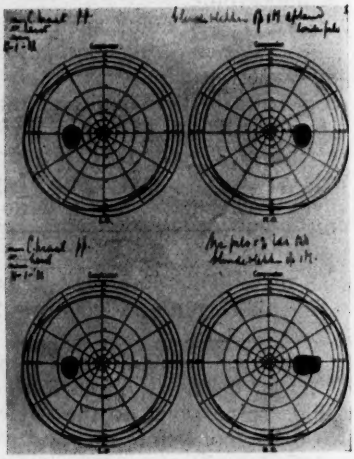
When turning back to our four patients, we take their visual fields for white and for colours and also their blind spots at 1 metre

distance, it appears that no alteration in these values is found. This, however, is not always the case.

Let me first stress the point that I am always very careful in proving anything by a method as subjective as the examining of the visual field or the blind spot. But considering these values as a link in a chain of symptoms they are valuable.

During the month of January, 1932, I saw a patient (case 5), a man, aged 49 years, suffering from chronic glaucoma in both eyes, having a tension of about 35 mm. Hg without any treatment. Instillation of a 2 per cent. solution of pilocarpine thrice daily





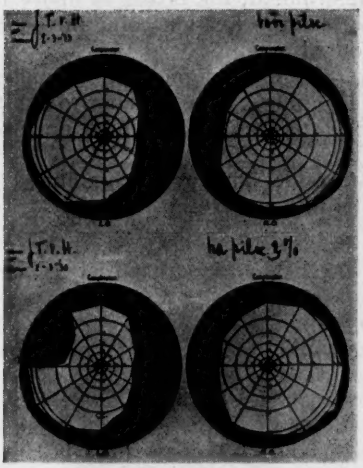
gave the beautiful result that the tension in both eyes kept below 25 mm. Hg. This patient did not complain of the relative central scotoma as described above.

The visual fields and blind spots, taken after instillation of pilocarpine were a little bit suspect, which is shown in the following pictures. There was no alteration for red and blue.

That the next patient, case 6, showed very remarkable alterations after the instillation of pilocarpine was without any doubt. I had his fields taken by different people both before and after the instillation of the drops and always got similar results.

Looking at the latter pictures one is inclined to think of a spasm of the vessels. I have tried to confirm this suspicion by experiments made first on a dog, later on, on rabbits.

Firstly an iridectomy was performed and at the same time the membrana nictitans was removed. By doing so we are able



to give pilocarpine and at the same time it remains possible to look at the fundus with an ophthalmoscope and even to make a photographic picture of it. Now the lethal dose of pilocarpine hydrochloride is found to be 0·12-0·23 grams intravenously injected in rabbits. In dogs it is considerably less. The minimal dose which causes vomiting is 0·7 milligram pro Kg.

After having them prepared in the manner described above I injected in one dog and nine rabbits pilocarpine hydrochloride, increasing the dose until serious symptoms appeared. Sometimes it was possible to save the animal by an injection with atropine, but in that case, of course, the experiment of the day was spoiled. The result of these experiments was discouraging. The changes in the vessels of the fundus which were sometimes found were so uncertain that they are not worth discussing.

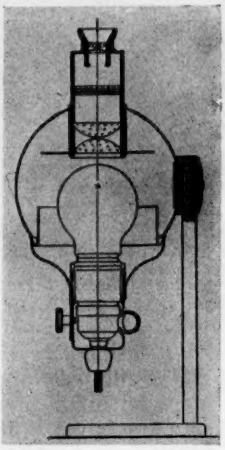
After this I examined my patients with Scheerer's entoptoscope. This instrument has been built for the subjective examination of the blood-current in the capillaries of the retina. On looking through it the red blood-corpuscles are distinctly seen as luminous rods on a bluish-violet background. As this phenomenon shows itself differently in different conditions of the eye, it may be useful for clinical purposes.

The instrument itself has been built up from an ocular, an iris diaphragm, a blue-violet filter, which only permits rays of a wave-length under 4,600 angström to penetrate, a condenser, and an electric bulb of 100 watt; which pieces are suitably mounted on a stand.

In using the instrument, the ocular is firstly focused in such a manner that one sees the fixation-point in the midst of the field without any coloured area.

By narrowing the diaphragm, the diameter of which can be varied from 18-1 mm., it is possible to limit and to measure the central zone of the retina, in which no bloodstream is seen (Maxwell's spot).

Quite a considerable amount of literature has been written already about this instrument and its use.



Scheerer[1] thinks that the phenomenon actually must be localized in the pre-capillary arterioles and that it is caused by total reflection of the red corpuscles, which become self-luminous.

F. P. Fischer[2] localizes the phenomenon in the capillaries and considers it to be caused by shadow-formation. He is very likely right in both considerations.

Gesker[3] was able to measure the apparent size of the centre of the macula, which was free from vessels. His opinion, that the movements seen must take place in the outer nuclear layer, is shared by Abelsdorff and Nagel.

Only by mechanical pressure the frequency and rhythm of the phenomenon can be altered, not by general or local intoxications.

Horniker[4] is of the same opinion. It is he also who lays stress on the importance of measuring the size of Maxwell's spot, by means of the diaphragm.

The values thus obtained fit in with a theory of pathology

and physiology of the capillary system, according to Ricker, O. Müller and his school. They take it for granted that these facts show a separate innervation of the macula.

Examining different patients with the aid of the entoptoscope I have been able to control and confirm the observations, made by these different authors. It appears to be evident—as has already been pointed out by Fischer—that even quite normal individuals do not always make identical observations and also that the phenomenon is observed differently on different occasions. But—and this is important—in those persons, who are getting relative central scotomata after the instillation of drops of pilocarpine, the phenomenon presents itself clearly without exception.

So I examined my patients, whose details I have given above, with this entoptoscope. They all agreed in telling me spontaneously that after the instillation of drops of pilocarpine they observed quite a remarkable slowing down of the blood-current, which in every case was followed by an enlargement of Maxwell's spot. Increasing during the first quarter to half hour after the instillation of pilocarpine, these phenomena disappeared after one hour. So their course was parallel to that of the diminishing of vision.

One question now became acute: "Can anything be done to prevent this supplementary action of pilocarpine?" I have much pleasure in being able to answer: "Certainly, and even in two ways."

First let us consider a patient, who is bound to take drops of a 2 per cent. solution of pilocarpine thrice daily and in doing so, suffers from a relative central scotoma, as described above.

If one makes him take at the same time thrice daily 0·005 grams of solutio nitroglycerini by the mouth, the relative central scotoma will not appear whilst pilocarpine still acts as usual, especially in regard to its action of lowering the tension of the eyeball.

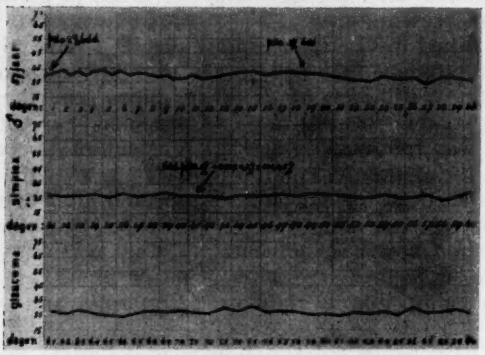
Solutio nitroglycerini contains 1 per cent. of nitroglycerine, dissolved in 90 per cent. alcohol. Small doses of nitroglycerine, such as mentioned above appear to be quite harmless. Nitroglycerine, however, also appears to act specifically on certain groups of small vessels, which possibly might give an explanation of its action in our case.

Secondly one gets the same result, namely the full action of pilocarpine without any supplementary action, if one adds just a little cocaine to the solution of pilocarpine.

After a series of experiments I take it for granted that a solution of 2 per cent. pilocarpine hydrochloride equals a solution containing: 1 per cent. pilocarpine hydrochloride, 0·3 per cent. eserine hydrochloride and 0·5 per cent. cocaine hydrochloride. In those patients who suffered from relative central scotoma, this supplementary action disappeared on substituting the above mentioned

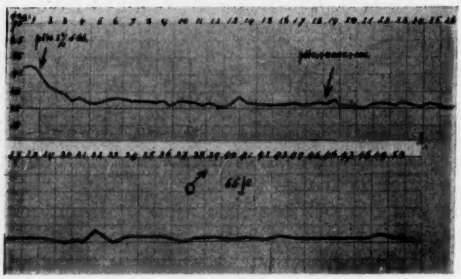
mixed solution for the usual 2 per cent. solution of hydrochloride of pilocarpine. The following curve shows, however, clearly that the beneficial action of lowering the intra-ocular tension is not at all interfered with.

The curve shows the intra-ocular pressure of a man, aged 57 years, badly suffering from glaucoma simplex, which had caused total blindness of the right eye and had left him a visual field in the left eye, whose margin nearly reached the centre. Only instillations of a 2 per cent. solution of pilocarpine as much as six times daily



could keep his intra-ocular tension about normal. His intra-ocular tension was controlled daily, often more than once. On the 19th day of the curve pilocarpine was changed into drops of the mixture of pilocarpine-eserine-cocaine. The curve shows no alteration at all, though the patient was under control for a considerable period (90 days).

A second curve shows the same in a man, aged 55 years, whose intra-ocular tension also behaved similarly after changing his



pilocarpine drops into drops of the above mentioned mixture. Neither of these two patients suffered from a relative central scotoma and the mixture drops were used only to demonstrate their effect on the intra-ocular tension and to make comparison with the effect, obtained by pilocarpine.

Summarizing I can say:—

1. Occasionally one meets with a patient, of middle or advanced age, who complains after the instillation of drops of pilocarpine of a temporarily serious diminution of vision. This is caused by a spasm of the capillaries in the region of the fovea centralis retinae, as has already been described by Hess.

2. Experiments on animals to prove this, have failed.

3. By using the entoptoscope of Scheerer this phenomenon can be investigated and confirmed beautifully.

4. The action of pilocarpine of lowering the intra-ocular tension remains the same, when one gives at the same time small doses of solutio nitroglycerini to the patients by the mouth, but the relative central scotoma—if present—disappears.

5. The same effect can be obtained by changing the pilocarpine drops into drops containing a mixture of pilocarpine-eserine-cocaine. In doing so the equation "2 per cent. pilocarpine solution is equal to a solution of 1 per cent. pilocarpine plus 0·3 per cent. eserine plus 0·5 per cent. cocaine" appears to hold good.

REFERENCES

1. **Scheerer, R.**—Die entoptische Sichtbarkeit der Blutbewegung im Auge und ihre klinische Bedeutung. *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXIII, p. 67, 1924.

2. **Fischer, F. P.**—Beobachtung und Beeinfluszung des Blutkreislaufes in der Retina. *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXIV, Jan.-Febr. H., S. 220-221, 1925.

3. **Gesker, Lulius.**—Over de physiologie van het entoptisch zien der bloedbeweging in het oog (Universitäts-Augenklinik, München). *Arch. f. Augenheilk.*, Bd. XCVI, H. 3/4, S. 419-31, 1925.

4. **Horniker.**—*Arch. f. Ophthal.*, Vol. CXXIII, pp. 286-360, 1929.

REPORT OF AN UNUSUAL CASE OF ORBITAL TUMOUR

BY

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MISS W., aged 18 years, came to the Moukden Hospital on April 30, 1931, with a huge tumour in her left orbit which was incompletely covered by the lids. It was concealed by a large eye shade which she was only, with difficulty, induced to remove.

She gave the following history:—When she was 13 years of age, one summer morning her left eye was noticed to be a little larger than its fellow and at the same time she accidentally discovered that she could not see with this eye. As far as she could recall the eyeball had gone on increasing, though very slowly, in prominence and in size. All the time, however, she suffered no great pain, though the feeling of tightness was always present.

On removing the large eyeshade there was to be seen an enormous tumour which, occupying the left socket and extending in all directions, protruded far beyond the limit of the orbit even though the socket itself was twice as large as that of the sound side. The upper and lower lids were tightly stretched, though normal in colour. The superficial veins stood out rather prominently. The upper lid was still moveable, but the lower palpebral conjunctiva adhered to the lower quadrant of the eyeball. This may have been due to the scraping done by the old fashioned Chinese practitioner from whom the patient received treatment four months before admission.

The cornea was completely covered by a thick, yellowish scab, which was due to the constant irritation resulting from the incomplete closure of the lids. No anterior chamber, iris or pupil could be seen. Sight nil.

The length of the palpebral aperture was 6·5 cm., that of the right eye was only 3·3 cm.

The following measurements were made before the tumour was removed. The circumference of the tumour as far posteriorly as it was possible to measure it was 19·5 cm. The greatest vertical height was 5 cm. The anterior pole (formed by the scab) projected forward from the temporal angle 5 cm. This point was 4 cm. in front of the cornea of the right eye.

The vision of the right eye was normal, for distance 6/6 and for near, Jaeger I. The optic disc was of normal colour and the retinal arteries and veins of normal calibre.

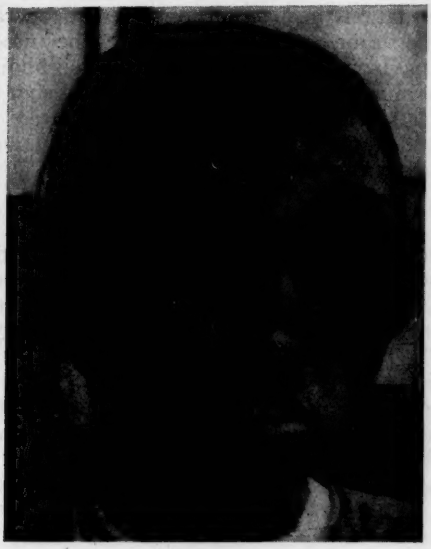

FIG. 1.
Photograph (enlarged) of the patient before operation.

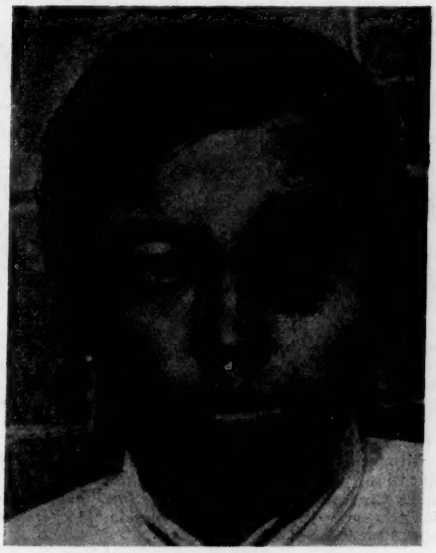

FIG. 2.
Photograph (enlarged) of the patient after operation.

Without hesitation the patient consented to operation. Exenteration was performed on May 3, 1931. The tumour came out very easily, having no adhesions to the neighbouring tissues. There was not much bleeding. The patient made an uninterrupted recovery and left hospital after a fortnight's stay.

Figs. 1 and 2 are from photographs of the patient before and after operation.

Pathological Report

Macroscopic examination. The tumour is ovoid, the antero-posterior diameter being greater than the lateral or vertical diameters. Near the anterior pole are the edges of the upper and lower lids which leave a fissure about 2 cm. in height and 6 cm. in length. The fissure is covered with a roughened surface to the centre of which is attached a scab.

Dimensions. Circumference in antero-posterior plane 21 cm.; circumference in lateral plane 18·8 cm.; antero-posterior diameter 7·5 cm.; lateral and vertical diameters 5·5 cm.

On opening the tumour, it was found to be a cyst containing about 90 c.c. of thick, brownish fluid. The wall of the cyst was fairly uniform in thickness in the posterior half, but anteriorly it was thickened considerably with the remnants of the eyeball, the thickened cornea and conjunctiva, and parts of the lids.

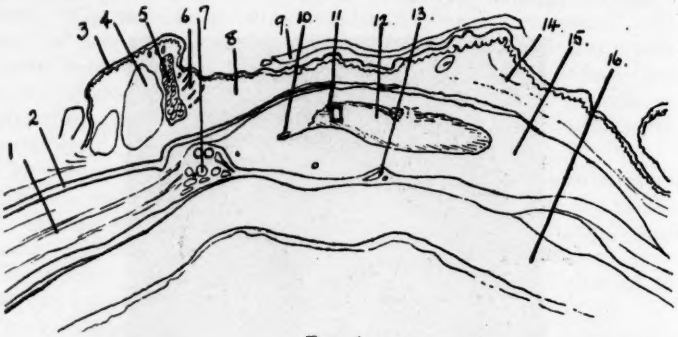

FIG. 4.

(×4) Section of the Anterior Pole of the Cyst. Schematic. 1. Loose connective tissue. 2. Band of dense connective tissue. 3. Squamous epithelium with papillae. 4. Skeletal muscle. 5. Sebaceous glands with a few hairs. 6. Mouths of sebaceous glands the epithelium being very irregular here and the sub-epithelial tissue infiltrated with round cells. 7. Group of small vessels with one small nerve. 8. Round celled infiltration. 9. Cornification. 10. Small nerve. 11. Pigmented tissue-remnants of choroid. 12. Remnants of retina. 13. Small nerves. 14. Round celled infiltration with many dilated vessels. 15. Dense connective tissue. 16. Wall of Cyst.

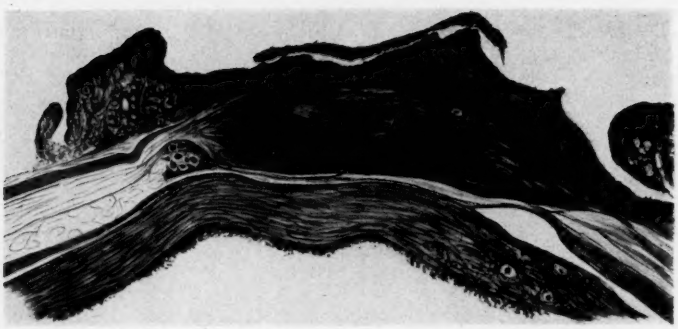

FIG. 3.

(×4) Section of the Anterior Pole of the Cyst, showing epithelial surface and below this the eyeball which has been completely collapsed by the pressure of the cyst behind it. Choroid remnants are prominent with their black pigment.

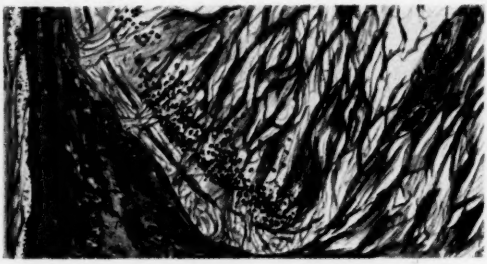

FIG. 5.

(×50 approx.) Retinal and choroidal tissue from the rectangle in Fig. 4.

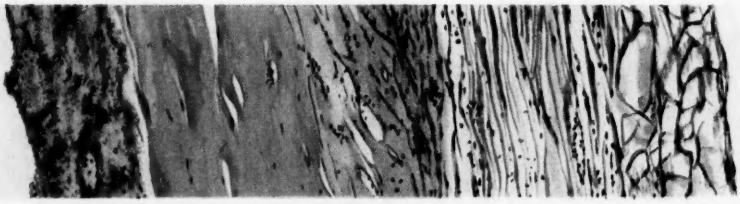

FIG. 6.

(×50 approx.) Wall of Cyst. Typical section with no epithelial lining showing, this having been destroyed by the haemorrhage.

The wall was firm and strong with a blackish-brown coating of coagulated and degenerated blood on its inner surface.

The wall of the cyst at the anterior pole was similar to that elsewhere, but anterior to it lay an elongated oval body with a clearly-defined very white wall of irregular width (Fig. 4, 15). This enclosed a black mass (Fig. 4, 11) in the centre of which there was a smaller, whitish body (Fig. 4, 12). The large, clear white body was what remained of the sclerotic coat of the eyeball, the dark mass the degenerated choroid coat and the small central whitish body the retinal remains.

The cornea and conjunctiva were greatly thickened. To the cornea was attached a cornified scaly mass. The edges of the lids were greatly thickened and showed a few eyelashes.

FIG. 7.

(× 50 approx.) Wall of Cyst at one point.

Microscopic examination. Fig. 3 represents a drawing of the anterior wall of the cyst with the flattened eyeball lying in front of it.

Fig. 4 is from a similar section and gives a schematic representation of the different parts.

Fig. 5 represents the small rectangular area marked out in Fig. 4. The arrangement of the nuclei in the non-pigmented part confirms the view that this is really retinal tissue, and that the cyst originated posterior to the eyeball and had gradually forced the eyeball forward and flattened it out on its anterior pole as it grew still larger.

Figs. 6 and 7 represent the wall of the cyst at other points. The first sections made were all similar to Fig. 6, which shows the fibrous wall with blood clot and degenerating blood on its inner surface. After cutting out several small pieces of the wall and sectioning them Fig. 7 was obtained, where the cyst's original lining membrane is still intact and undamaged by the haemorrhage which must have taken place into the cyst. This lining is composed of squamous epithelium and the cyst is, therefore, an epithelial or dermoid cyst.

While cysts of this type are often found in the region of the eye the interest of this case lies, first, in the fact that it must have arisen posterior to the eyeball, and secondly, in the size to which it has grown causing complete flattening of the eyeball as seen in Figs. 3 and 4.

In the literature on tumours of the orbit to which I have had access I have not been able to find a case similar to this one.

I wish to express my thanks to Dr. Garven for the notes on the pathological examination and also to Mr. Li Hung Hsin for the drawings.

TRACHOMA IN THE INDIANS OF WESTERN CANADA

BY

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THE trachoma situation in the Indians of Western Canada constitutes a serious problem when viewed from the economic, humanitarian and public health standpoints. To form an adequate conception of the visual devastation wrought by this disease together with its complications and sequelae, one should really visit some of the Western Settlements.

The total economic loss resulting from the ravages of the disease, is difficult to compute at the present time. Many Indians are in their transitional period in various parts of the West. Hunting and trapping as a sole source of livelihood for these people has largely disappeared, being replaced by agriculture and stock raising on Reserves placed aside for their use. Civilization with all its resultant obligations and dangers to these peoples has definitely supplanted the old régime. Huts and houses, frequently overcrowded and usually badly ventilated in the colder weather, have replaced the admirable teppee and tent. Every effort must be expended to check trachoma and the economic loss engendered by the disorder in those individuals whose ultimate disability precludes any possibility of self-support. Failing this, contributions must be forthcoming from the public treasury toward such an individual's support which would undoubtedly constitute a considerable financial outlay by the country in the future.

One must take cognizance of the humanitarian aspect of this malady. The suffering of many of these afflicted individuals is most intense, due to the chronic or sub-acute inflammation of the eyelids and also to the accompanying iritis. The latter, especially,

is present throughout the summer months when the intense heat, fine alkali dust and sand storms aggravate the condition. During this period a sub-chronic or chronic stage advances to that of a sub-acute condition. The constant spasm of the orbicularis muscle, the photophobia, the lacrymation and congestion of the ocular vessels, convey to the observer an intimation of the pain and discomfort of the individual.

Trachoma is not confined to the Indians alone. Many cases can be noted in immigrants of Eastern and South-Eastern European extraction. Similar cases have been seen in the Chinese of British Columbia. Many people of mixed Indian and white blood are afflicted with the disorder. Non-amenable to administration and regulation, as are the Indians under their agent, these folk frequently wander from place to place during such periods as they are not settled adjacent to a Reserve. A certain element of these half-breeds unfortunately consider themselves far superior to either the white or Indian element. It is feared that any measures instituted to eradicate this communicable disorder or control the wanderings of these people will be met with little enthusiasm and even passive opposition.

Cases of trachoma in the Indians are distributed from Ontario westward through the Prairie Provinces and into British Columbia. Ontario has the lowest incidence, the greatest occurring in the central and southern parts of the prairies together with the eastern and central portion of British Columbia. In this area at least 70 per cent. of cases of markedly impaired vision or incurable blindness is due to this malady, together with the complications and sequelae. In certain settlements the incidence of infected individuals may reach 40 to 50 per cent. of the population. The northern portions of Alberta, Manitoba and the Pacific coastal region are the least affected. Cases disclosed in these latter areas are of a much more benign character than those encountered in the trachoma "belts" of the prairies and British Columbia.

Factors contributing to the high incidence and severity of cases are high altitude, finely pulverised alkali soil, frequent sand and dust storms, intensive heat and extreme dryness of the summer season. Settlements where these conditions prevail, where housing conditions are poor due to overcrowding, where there is a lack of individual and personal hygiene, invariably demonstrate the highest percentage of blindness. Fine alkali dust and sand blown by the high winds into the eyes of trachoma patients aggravate the already-present conjunctivitis which is further increased by rubbing with the hands and fingers. Small abrasions are formed in the cornea by the fine scarifying bodies. The superimposed irritation leads to a more rapid growth of the trachomatous pannus downward through the cornea. The possibility of corneal ulcers

increases with their ever present danger of either perforation of the globe or subsequent formation of thick corneal opacities which in many cases are prone to cover the pupillary area.

Serious impairment of vision can usually be attributed to one or a combination of the following causes:—

(*a*) Perforation of the globe due to trachomatous ulcer which may permit some of the eye contents to escape. The end result of this is a sightless, shrunken eyeball.

(*b*) Dense opacity of the cornea from trachomatous pannus. Infiltrating from above downwards, this process advances into the cornea accompanied by numerous arborescent vessels. The remarkable smoothness, lustre and transparency of the normal structure is converted to a rough, dull opaque structure somewhat similar to that of irregularly heavily-frosted glass. The ultimate appearance of the eyeball is that of a boiled onion.

(*c*) Diffuse corneal opacities from trachomatous ulcers. When situated in the area of the pupil these may greatly limit or even totally prevent the transmission of visual stimuli to the retina.

(*d*) Secondary glaucoma from the formation of plastic exudates with consequent blocking of the filtration angle.

The general Indian conception of the disorder is not that of a communicable disease. Many believe the process of losing their sight is concomitant with greying hair and other manifestations of age changes, impossible to be avoided. These cases correspond to the type which have slowly and progressively lost their sight by pannus advancing into the cornea. Others who have been blinded by the more fulminating process of a perforating ulcer claim this disaster was due to a foreign body which entered the eye at any time from a few minutes to a few hours prior to the calamity. Others with a badly damaged cornea due to pannus and opacities explain their condition as the direct result of being bewitched by an enemy or conjuror, by means of a spell or a charm especially designed against the victim. None of these patients will ever surmise the identity of the responsible party. The belief holds that divulging the name of the sorcerer will be followed by still more dire consequences. The only relief to be obtained is through the offices of a necromancer, who will prescribe some medicine or charm which will remove the sand which had been originally conjured into the eye.

Many cases of trachoma noted in the children are undoubtedly attributable to the old grandmother occupying the same house. These old people are very strongly attached to the young children, especially the grandsons. The usual head dress constantly worn by these old people is a large silk kerchief. This is worn over the head in a manner very similar to that seen in the peasants of Eastern Europe. The scarf is tied under the chin with a large

knot, the loose ends of which hang downwards. The loose ends are always utilized to mop away the continuous secretion from the diseased eyes which constantly overflows the cheeks. It serves a dual, but dangerous, purpose to wipe the nose and cheeks of the child which she so frequently coddles. It is not surprising that many cases are noted in young children.

The general lack of even elementary and individual hygiene in many of the Indian houses plays an important rôle in the dissemination of trachoma. The common towel and wash basin utilized by a whole family and their visiting guests is a frequent sight. In a household harbouring an advanced case with profuse secretion, it is not uncommon to note a majority of the other members afflicted with the disorder in varying stages.

It has been occasionally suggested that trachoma is caused solely by nutritional disturbances and unbalanced diet. Observations made with an impartial mind demonstrate that this is a ridiculous and untenable conception. It is quite certain that, all other factors being equal, a patient with a scrofulous diathesis or suffering from mal-nutrition tends to run a more malignant and refractory course. In such cases phlyctenular conjunctivitis is not infrequently an accompanying disorder. Scrofulous cases treated with copper citrate ointment or copper sulphate pencil for four months demonstrate a response similar to that noted in a more healthy individual with similar medication for a six weeks' period. To supplement all ocular therapeutics, an abundant diet is recommended, especially for those cases in the residential schools. The importance of this auxiliary measure in the eradication of this disorder in the young is constantly stressed. Mal-nutrition or avitaminosis when represented as the sole causative factor in trachoma must be rejected as a most dangerous theory.

The exact causative organism of trachoma has not been definitely established, although great credit is due to Lindner, Prowaczek and Noguchi for their efforts in this field. Whatever the exact aetiological factor may be, it is important to stress the part played by the pathological eye discharge in spreading the disorder. The danger of an individual to a community is in direct proportion to the amount of lacrymal secretion. A trachoma patient with complicating corneal ulcer and profuse discharge is especially dangerous as an agent of dissemination.

The possibility of the Indian introducing the disease into the white population must not be overlooked. If the Indian Reserve were an entirely self-supporting economic unit and the Indian confined entirely to his settlement, little danger might be anticipated by the surrounding white element. The Indian population is increasing. Over population will ultimately force, and is forcing in some areas, the individual to secure a supplementary living from

labour in the surrounding territory. Many Indians augment their living on the Reserve by temporary employment with surrounding farmers. Others are engaged in fishing, canning, hop-picking, and cattle round-ups. Some of the girls secure employment as domestics in homes and hotels, others marry whites and leave the Reserve. The danger of positive cases introducing their disease into those workmen with whom they fraternise and associate is very apparent. Especially true is this in places of congregation such as bunk-houses where the roller or common towel, wash basin and soap would prove most important links in the chain of dissemination. Although my work is confined almost entirely to Indians, cases have been noted in the whites which undoubtedly had their origin in the native population. The Indian is no greater menace today than is the person of mixed blood or half-breed. As time progresses and more residents of a Reserve seek employment amongst the whites, the danger will be correspondingly increased.

A rancher of British Columbia had contracted the disorder from Indians whom he had employed in a cattle round-up a few years ago. On examination the lids were hypertrophied, granular and intensely red. Pannus with vascularization had advanced downward into the cornea. Fine vessels were present over the pupillary area. The sensation in the lids was described as that of red hot emery particles. Sleepless nights come with the advent of hot weather and dark glasses are worn constantly during the summer to relieve the photophobia. A diagnosis of granular lids had been made previously and yellow oxide of mercury prescribed. The condition subsided with the advent of cold weather. The term granulated lids did not alarm the patient, who was unaware of the malignant character of the disease. Further relapses were attributed to the intense sunshine.

Many people hold the term "granulated lids" to be synonymous with a blepharitis in which the small incrustations along the lid margin appear as "granules" somewhat similar to small pieces of "granulated" sugar. The term conveys little to the patient as to the seriousness of the disease. The profession would be well advised to abandon entirely the terms "granular" and "granulated" lids. It is to be urged that the term trachoma only, should be used to patients and the malignant and communicable character of the disorder emphasized.

One of the most important steps towards the eradication of trachoma amongst the Indian people will be education. The fatalistic conception that, once the disease has been established, nothing can be accomplished other than awaiting the inevitable outcome, must be offset. Considering the mentality of these people, the results to date have well justified the efforts expended. Special attention is given to the older Indian and Medicine Man who is

encouraged at clinics to note the manifestations and ravages of the disorder. Demonstrating a few children with normal eyelids together with a second group of positive cases who come from families where the disease has wrought havoc with vision, conveys the idea of the communicable nature. The abundant masses of soft gelatinous follicles in the lids of this group are drawn to their attention. These people realize the communicable character of diseases like small-pox, but had little conception that trachoma was of a similar nature. The importance of fingers, hands, towels and wash basins, in spreading the disease is emphasized.

Improvements are frequently noted on a return visit to an area where many of the positive cases have since provided their own toilet articles.

The old women are much more intractable in this respect than the older men. They view with suspicion any suggestions coming from a stranger and are inclined to scoff at anything savouring of advice. Other than through the influence of the husband, it will be most difficult to enforce the discontinuance of the practice of wiping the children's faces with the end of the head kerchief which is constantly used to mop the secretion from her own diseased eyes. Much less difficulty will be experienced with the younger mothers who have had an opportunity of training in the residential schools.

The residential school should prove to be a most valuable asset in educating the rising generation to the danger of the disease and its manner of propagation. The importance of early and consistent treatment is learned by the pupils, many of whom are under treatment. Extreme care is exercised to render treatment as gentle and painless as possible.

Criticism of this policy is justifiable on the basis that these cases are a grave menace to the non-infected pupils, and should never have been admitted to these institutions. The ideal would undoubtedly be trachoma-free schools. Returning these children to their homes would result in their securing little medical attention and the proper nutrition which is so necessary to supplement the former.

The experience of other nations has demonstrated that once trachoma has been introduced to any great degree, the process of extermination has been measured in terms of years and not months. Since it has obtained such a foot-hold in the Canadian Indians, there is little evidence to presuppose that the disorder will be of any shorter duration. On the contrary, in addition to other factors, there must be overcome certain fundamental prejudices which are inherent in the Indian nature. The pupils of today will become the parents of tomorrow, and it is most essential that they secure enlightenment regarding the disorder. The school is the natural and most advantageous place from which to spread all propaganda.

The common roller towel has been eliminated from these schools and each child has an individual towel, basin, and soap. The positive cases have their pillow sheets, towels, etc., marked with a large square of turkey-red unbleachable cotton percale. Strict discipline is maintained regarding the use of toilet articles. Presupposing infection during play hours in the late afternoon, each child who is negative receives prophylactic drops of zinc sulphate one-quarter per cent. (0·25 per cent.) each evening. This measure has proved quite effective to date. In addition to any other treatment all positive pupils receive at the same period trachomine ointment. Towels, handkerchiefs, etc., from the infected pupils are boiled separately for 20 minutes before being laundered. Antiseptics such as creolin, lysol, etc., and their derivatives are discouraged for laundry purposes as there is always a danger of over-confidence in their value. The extremely alkaline reaction of the water through chemical interaction seriously interferes with their antiseptic properties. Special regulations have been laid down with respect to the bathing of the trachoma patients. Every effort is made to protect the uninfected individual from accidentally contracting the disorder. To date the regulations, wherever carried out, have proven quite satisfactory. Cases developing a corneal ulcer with consequent marked lacrymation with high index of infectivity, are especially guarded against.

It might be of interest to discuss briefly the possible origin of trachoma in the Canadian Indians. Many of the more intelligent and older members of the Stoney and Cree nations believe the disease was introduced by infected Indians from the United States who accompanied the early traders from the American side into the southern parts of the Prairie Provinces and British Columbia. Many of these visitors remained and were absorbed into the Western bands. Some of the more responsible Indians claim this to be the manner in which trachoma was introduced to their people.

That the Indians might have contracted the disorder from the earlier white settlers may be possible but is highly improbable. Many of these foreigners did not arrive in the country until after 1890, and it is scarcely conceivable that the disease could become so generalized throughout the West in such a limited period. Many of the older infected Indians maintain this eye trouble was present in their own families with the resultant blindness long before the advent of the European settler.

Certain authorities claim that the American Indians were originally a group of nomad races from the plains of Mongolia, who crossed to the American continent in various huge migrations. Should this be true and one considers the incidence of trachoma in the Mongols, it is quite possible that the Indians have had

the disorder from time immemorial. The presence of the disease in large numbers of people in the hinterlands of British Columbia could well be accounted for on these premises, as little fraternizing is encountered between the Indians to the east of the Rocky Mountains and those living on the western and Pacific side. It is scarcely possible that one or other of these large groups of Indians differing entirely in mode of life, customs and language, would be responsible for the disorder in the other group. Quite compatible with the possible Asiatic origin of trachoma is the fact that many of the Indians held a fatalistic and stoical conception of the ultimate results to be expected in one who had the disease. From all observations they have no drugs of any value against the malady and the condition was permitted to run a course devoid of even primitive medication. A long experience and contact with the disorder would cause them to view the whole process from such a fatalistic standpoint. Many old people who have lost the major portion of their sight years ago, assert that their immediate parents and grandparents were afflicted in a similar manner. At present the best evidence would indicate that trachoma has been present in these people for generations.

Certain observations might prove of interest.

(*a*) The familial character of trachoma. The chief source of infection and the great channel of transmission is through the family. Examination of children coming from various districts in the residential school invariably indicates the families and areas where one can be certain to encounter the disorder in the greatest degree. In such an area one notes either mental lethargy or stupid stoicism in the attitude of the inhabitants toward the disease. They either see or do not see, and many do not recognize any gradation lying between these opposite poles. This may be due possibly to the insidious onset and imperceptible continuity of the process.

(*b*) Certain cases tend to be more resistant to treatment where an accompanying scrofulous diathesis exists. Production of scar tissue by various methods of stimulation has a much poorer response than in more healthy individuals.

(*c*) Climate and local factors have an important bearing on the incidence and severity of cases. Areas with high altitude where fine alkali dust, frequent dust and sand storms, intense dryness and heat exist, have the highest index. Here also are encountered the most extreme cases. Districts such as Northern Manitoba or Alberta and in the coastal region of British Columbia where there is more abundant rainfall and much green foliage appear to have a much lower incidence. Positive cases have a much more benign character. It is highly improbable that the more exclusive fish diet of the lower areas as opposed to the high meat consumption in the trachoma belts, has any appreciable influence on the condition.

(*d*) Certain individuals in "trachoma" families appear to have an inherent immunity to the disorder. There is little reason to presuppose that they had not been repeatedly infected as no undue precautions have been instituted to protect themselves against others within the same household.

(*e*) Some cases become quiescent with the history of total absence of treatment. The lid condition shows no signs of any activity and casual examination of the pannus shows a relative anaemia. The blood vessels in the area are noted with the 8 magnification glass. How treacherous is this condition only observation and time will tell. Such cases are classified as "arrested."

(*f*) Trachoma does not run a steadily progressive and destructive course. Periods of exacerbations are interpolated between those of the dormancy of sub-chronicity. Many cases of natural "arrest" may prove to be only manifestations of a dormant state. Limited observations to date would appear to confirm this.

In conclusion it may be stated that every effort is being expended compatible with available finances, to bring the situation under control. Dr. E. L. Stone, Director of Medical Service, of the Department of Indian Affairs, is to be commended for instituting the campaign which, it is hoped, will ultimately eradicate trachoma in the Indians of Canada. In this connection, it is most important to keep enthusiasm alive and be prepared to be undeterred by apparent regressions in certain areas. The characteristic chronicity of the disorder will only be overcome by persistent effort. Education of the rising generation with subsequent co-operation on their part, will undoubtedly prove the most potent factor in the solution of the trachoma problem in their people.

OPHTHALMOPLEGIA ASSOCIATED WITH BONY CHANGES IN THE REGION OF THE SPHENOIDAL FISSURE

BY

CHARLES B. V. TAIT

LONDON

MY reason for recording the details of this case is twofold. First because uncertainty must attain as to the nature of the lesion and secondly, in spite of the very extensive nature of this lesion and the gravity of the prognosis, the patient has made an almost complete recovery.

M. S., a schoolgirl, aged 17 years, had been referred to Mr.

L. Bathe Rawling with the suspected condition of cerebral neoplasm. She had been in normal health up to the time of her summer holiday, when she commenced to suffer with sharp pains over the right eye which became severe and spread to the right temple. The pain gradually became dull and nagging in character. The right eye subsequently squinted, and it was noticed that the lid drooped; coincident with the appearances of these symptoms vomiting began independent of the taking of food and was said to be projectile in character. Pain was constantly present.

During the development of these symptoms she felt unwell and lost weight. Ptosis became complete within two weeks of the commencement of the pain.

Examination revealed complete ptosis of the right lid, while the pupil was semi-dilated, regular and responded, but sluggishly, to light stimulus. There was complete paralysis of all the extra-ocular muscles. Unfortunately the visual acuity was not recorded, although there appears to have been some impairment of function of the optic nerve. Some hyperaesthesia of the right supra-orbital branch of the Vth nerve was present, while corneal sensation was impaired.

The fundi were normal, as was also the central nervous system.

Progress of the disease.—Ten days after first coming under observation, the left eye became similarly involved—first pain, then ptosis.

X-ray of the skull demonstrated extensive erosion in the region of the sphenoidal sinus, with destruction of the clinoid processes of the sella turcica, together with most of its floor, but with no definite evidence of tumour. The interpretation favoured erosion in this region rather than pressure absorption.

The cerebro-spinal fluid was not under increased pressure. The total protein was 100 mg. per 100 c.c. Cultures were sterile after 48 hours.

The Wassermann reaction on the cerebro-spinal fluid was negative and the examination of the blood normal.

The patient was seen by Mr. Foster Moore, who reported the presence of slight but insignificant proptosis and considered that an intra-orbital lesion of sufficient magnitude to cause such complete immobility of the eye would also produce a definite proptosis. He considered the lesion to be intra-cranial.

In a further report 10 days later, subsequent to the X-ray examination, he comments upon the involvement of the nerves of the left eye—and found evidence of pressure upon the left optic nerve in the form of a scotoma for red without gross contraction of the visual field. It was not in any way like a thrombosis of the cavernous sinus, but suggested a definite lesion involving the optic and orbital nerves on both sides which, in the absence of syphilis

and in view of the erosion of bone as demonstrated on the X-rays, together with the rapid progress of the disease, suggested a spreading sarcoma.

Treatment.—A tentative course of X-ray therapy was commenced, directed towards the affected region, 24 applications in all being given. A rapid response was soon observed with the relief of pain and the gradual return of the functions of the IIIrd and IVth nerves. The VIth nerve exhibited the slowest response.

At the present time, 4 years 6 months after the onset, she is in good health and has completely recovered except for some residual weakness of the external rectus of the right eye.

Discussion.—On the clinical grounds, this girl shows many of the features which characterize the condition described by James Collier and termed rheumatic periostitis of the sphenoidal fissue.

The salient features of these cases are:—

1. Pain over the orbit often of an excruciatingly severe intensity.
2. Varying degrees of proptosis.
3. Tenderness of the globe.

It may occur at any period of life, but it is more frequently met with in young adults, and while one uni-ocular attack is the general rule, it has been known to recur and to involve both eyes.

The lesion is a periostitis of the sphenoidal fissue and surrounding bony region involving those structures which pass through it, notably the VIth nerve, which is the first and often the only nerve affected, but which may progress with the implication of the IVth, Vth 1st division, IIIrd and Vth 2nd division in that order. The optic nerve is rarely affected. The lesion is amenable to mercury inunction and salicylates, together with the application of heat to the region for the relief of pain. Recovery takes place in a few weeks to a few months.

Collier observes that it may be associated with involvement of other cranial nerves as they leave the skull, but the VIth nerve is the most vulnerable.

Kinnier Wilson recognizes cases of unilateral cranial polyneuritis in which other nerves besides the oculo-motor ones are involved, and to which he ascribes a rheumatic aetiology.

It is doubtful, however, if such a lesion would explain the extensive involvement of bone, and I have found the report of only one case which bears any comparison from the radiographic standpoint.

Roper has met with a case presenting features somewhat similar to that under discussion. This was a woman, aged 45 years, complaining of dull pain over the right eye and brow, who had oedema of the lid and proptosis of that side. An X-ray revealed what appeared to be ivory exostoses of both alae of the sphenoid.

The vision was full and the fundi normal. X-ray therapy was undertaken, producing rapid relief of pain, while a subsequent picture showed a "worm eaten" appearance of the alae of the sphenoid.

It is a significant feature common to both cases that the pain was rapidly and permanently relieved by the application of X-rays, while in the case of the schoolgirl the cessation of the progressive deterioration of her general condition was coincident with the commencement of the treatment, and what was at the time considered a probably fatal condition may now, after the lapse of 4 years 6 months, be deemed a cure.

I am indebted to Mr. L. Bathe Rawling for his kindness in allowing me access to the notes of this case.

REFERENCES

Collier, James.—Discussion on ocular palsies. Combined sections of neurology and ophthalmology. *Proc. Roy. Soc. Med.*, Vol. XIV, 1921.

Roper.—Diagnosis and significance of proptosis. *Trans. Ophthal. Soc. U.K.*, Vol. XLIII, p. 201, 1923.

INTERNATIONAL ASSOCIATION FOR THE PREVENTION OF BLINDNESS

Meeting of the Executive Committee, Monday, May 14, 1934, at 9.30, at the Hotel Majestic, Paris

Present:—Professor DE LAPERSONNE, *Chairman;* Dr. PARK LEWIS, *Vice-Chairman;* Mr. DEMACHY, *Treasurer;* Dr. LEWIS CARRIS, *Representative for the United States;* Dr. A. CHURCHILL, *Associate Secretary General.*

Mr. N. BISHOP HARMAN, *Honorary Member.*

Professor VAN DUYSE (Belgium); Professor HENNING ROENNE (Denmark); Professor MARQUEZ (Spain); Mr. CRIDLAND (Great Britain); Dr. TRANTAS (Greece); Professor VAN DER HOEVE (Netherlands); Professor DE GROSZ (Hungary); Professor MAGGIORE (Italy); Professor SZYMANSKI (Poland); Members of the Executive Committee.

Dr. ISSA HAMDI EL MAZINI BEY (Egypt); Dr. MARX (Netherlands); Members of the Commission for the Classification of the Causes of Blindness.

Address by Professor DE LAPERSONNE, *Chairman.*

GENTLEMEN,—

I beg to present to you a brief account of the work of the Association during the last year.

May I remind you that thanks to the kindness of my eminent friend and colleague, Professor MARQUEZ, Chairman of the XIVth International Ophthalmological Congress, and of its Secretary General, Dr. POYALES, our General Assembly was inscribed foremost on the agenda of the Congress. At this meeting in which the Chair was held by our dear Vice-Chairman, Dr. PARK LEWIS, the very important question of the classification of the Causes of Blindness was discussed, and after examining the various schemes submitted, the Assembly decided to appoint a Commission including: Professor VAN DUYSE (Belgium); Dr. MAZINI BEY (Egypt); Professor DE LAPERSONNE (France); Mr. BISHOP HARMAN (Great Britain); Dr. MARX (Netherlands); Professor MARQUEZ (Spain); Dr. PARK LEWIS (United States), whose task it would be to examine at leisure and impartially the problems raised in the course of the discussion.

We thought this was the most suitable time to summon a meeting of this Commission and we forwarded to you, together with the account of the Assembly in Madrid, the complementary reports we had received since that date. After the discussion you will decide whether it would be advisable to appoint a General Reporter, who would prepare a report on the subject and suggest resolutions which, after they have been presented to you individually for your advice, would be submitted for approval to the General Assembly in 1935. We shall take this opportunity of asking your opinion on the city which will be selected for this Assembly.

The second session of our Meeting in Madrid was devoted to the interesting accounts presented by the representatives of National Committees in Argentine, Austria, Belgium, Brazil, Bulgaria, Germany, Hungary, Italy, Japan, the Netherlands, Poland, Portugal, Roumania, Spain and Switzerland.

During the last year we have kept up a correspondence with these different committees. We expressed our respectful sympathy to the Royal Houses of Belgium and the Netherlands who had kindly granted their patronage to our National Committees. We especially begged H.R.H. the Duchess of Vendôme, Member of our Honorary Committee, to accept a token of our respectful grief on the occasion of the dramatic death of her august Brother, HIS MAJESTY KING ALBERT THE FIRST.

Our Secretariat has been happy to record the active propaganda campaign carried out by the Indian Red Cross, thanks to the

zeal of its organizing Secretary, Miss NORAH HILL. This powerful organization will be represented this afternoon by Sir JOHN MEGAW.

I beg to mention briefly the "Protestant French Organization in Syria and Liban" in the campaign against trachoma.

Our eminent colleague, Professor MAGGIORE, forwarded to us the very interesting Instructions of the Minister of National Education in Italy with regard to the establishment of sight-saving classes.

In Canada we obtained the adhesion of the Canadian National Institute for the Blind, which deals also with prevention and sends us its periodical publications and propaganda posters.

Finally, the National Society for the Prevention of Blindness in the United States, in cordial collaboration with our Association, forwards regularly its very valuable literature, its instructive Sight-Saving Review, and the numerous communiqués issued by the American Press. This Society kindly presented us with several copies of the film on the Prevention of Blindness which has been used in France, Great Britain and South Africa. It would be desirable that the public bodies should recommend the duty-free admission of the Public Health Propaganda Films; their exportation into a foreign country actually involves almost unconquerable difficulties. A resolution to this effect was adopted at the last International Congress of the Educational Film in Rome.

We devoted a good deal of our time to the preparation of the General Assembly which is to meet this afternoon. We wish to convey our thanks to those who have helped us to organize this important session devoted to trachoma, more especially to the International Organization against Trachoma and to our friend DE GROSZ, to the League against Trachoma of Morax, and to the eminent colleagues whose reports we were able to print and distribute before the Congress; may I mention in the first place the name of Dr. MACCALLAN?

I come to the financial situation. Our devoted treasurer, M. DEMACHY, will give you an account of the receipts and expenses during the last year, as well as of financial provisions for the current year.

Here again we find at the head of our subscribers the National Society, from the United States. In the midst of a financial crisis this Society has not hesitated to increase by 50 per cent. the most generous donation accorded to our Association so that the latter should not feel the effects of the variations in the rate of exchange.

We beg Dr. PARK LEWIS and Dr. CARRIS, who represent this Society, to accept the expression of our deepest gratitude.

In France, the Ministry of Public Health, in spite of the budgetary restrictions, has not only renewed, but increased the

annual subsidy granted to the Association, which amounted last year to 15,000 francs. We beg the Minister to accept our most sincere thanks for his kind support. Among private subscribers may I mention the General Insurance Committee (France)? Its distinguished Chairman, Mr. MAX HERMANT, has given us a new token of his most valuable collaboration.

In Great Britain, our friend Mr. CRIDLAND, has increased our Membership list thanks to his kind propaganda on behalf of the Association. Finally, I take pleasure in informing the Committee that Mrs. CORRIGAN, an eminent member of the American Colony in Paris, has been so good as to grant us, at the request of H.R.H. the Duchess of Vendôme, a most generous contribution of 3,000 francs on the occasion of our Meeting of May 14th. We beg to express our most grateful thanks to the Duchess of Vendôme and to Mrs. CORRIGAN.

May I remind all the Members of the International Association of the resolution adopted in Madrid, according to which the contribution of each country belonging to the Union, towards the budget of the Secretariat, should be at least 500 French francs. I beg to congratulate the countries who have responded to this appeal and I hope that this year, their example will be followed by the 38 countries which belong to the Association. This is a very important matter for the Association.

Financial Account

by M. DEMACHY, *Treasurer.*

During the period January, 1933 to January, 1934, receipts and expenses have been as follows:—

RECEIPTS		EXPENSES	
France	30,485.—	Salaries and reimbursements ...	28,200.—
United States ...	24,915.—	Stenography	9,931.80
Great Britain ...	3,502.35	Publicity	6,000.—
Canada	500.—	Postage and telegram expenses	2,264.85
Spain	500.—	Stationery...	1,004.10
Greece	100.—	Rent, light and heating ...	4,000.—
Morocco	100.—	Printing expenses	3,693.45
South Africa ...	203.53	Expenses for the Madrid Congr.	2,930.30
British India ...	25 20	Purchase of publications ...	298.85
		Reimbursement to Mr. Cridland	187.90
		Divers	1,369.65
	60,331.08		59,880.90

We beg to point out that the expenses figure is below that of 62,000 francs mentioned in the budgetary provisions which had been approved by the Executive Committee at Madrid. Thanks to this effort and thanks to the generosity of the "National Society

for the Prevention of Blindness" which, in the midst of a financial crisis, did not hesitate to increase by 50 per cent. its annual contribution (which has been raised this year from 1,000 to 1,500 dollars), so that the International Association should not be worse off as a consequence of the variations in the rate of exchange, we have been able to balance the budget.

This year again, we beg to draw your attention, as we did last year, to the disproportion between the contributions received from various countries and to remind all the Members of the Association of the resolution adopted by the General Assembly at Madrid, according to which each country belonging to the Association should pay a contribution of at least 500 French francs. We express our warmest thanks to the countries which so far have responded to our appeal—Canada, Greece, Hungary, Poland and Spain.

We submit on the other hand budgetary provisions for the current year:—

RECEIPTS		EXPENSES	
Subscriptions collected in 1933 for 1934	3,600	Salaries and indemnities ...	28,200
Subsidy from the French Ministry of Health for 1934	15,000	Stenography	9,600
Private subscriptions for 1934	9,400	Rent, light and heating ...	4,000
Subvention of the National Society for the Prevention of Blindness	25,000	Postage and telegram expenses	6,000
		Printing expenses	4,000
	53,000		51,800

These provisions provide for an effort at budgetary restrictions; we beg to point out that it would be difficult to reduce further the budget of the International Association while maintaining its activities on a level which is consistent with the task entrusted to it.

The Chairman thanked M. DEMACHY for his careful management of the modest resources of the Association.

The Treasurer's report was unanimously adopted.

Re-election of the Staff of the Association

In accordance with the bye-laws the agenda includes a paragraph with reference to the election of the Staff.

The Chairman informed his colleagues that he had received from Dr. HUMBERT a letter requesting the Committee to accept his resignation as Secretary General of the Association; his professional duties in Switzerland prevented him from attending to the work of the Association as much as he would have liked to, and from being present at the meetings. The Chairman felt convinced that all the Members of the Committee would share

his regret at Dr. HUMBERT's decision. He recalled his self-denial and his invaluable services in the provisional Committee which had laid the foundations of our Association, his outstanding part in the creation of the Association in 1929, at the Hague-Scheveningen and during the early and difficult period of organization. He hoped that Dr. HUMBERT might reconsider his decision and again give us the support of his valuable advice. As a token of gratitude for past services he proposed that the Committee should maintain Dr. HUMBERT at his post for another year. The organization of the Secretariat and particularly the services of Dr. A. CHURCHILL, Associate Secretary General, enabled the work to be carried on as usual under present circumstances (general approval).

The Staff was unanimously re-elected.

Honorary Members

Professor VAN DER HOEVE had requested that his name be omitted from the list of the Executive Committee; he had proposed the name of Professor ZEEMAN (Amsterdam) to represent the Netherlands on the Committee. The Chairman requested the Committee to inscribe the name of Professor VAN DER HOEVE, former President of the International Ophthalmological Congress, at Amsterdam, one of the main founders of the Association, among Honorary Members, to replace the late Professor ANGELUCCI. (Marked approval.)

Members of the Executive Committee

Professor ZEEMAN (Amsterdam), was appointed a Member of the Executive Committee, to replace Professor VAN DER HOEVE. He had notified his acceptance of this post. Up to this date Sweden was not represented on the Committee. The Secretariat had taken the initiative of applying for the adhesion of Professor NORDENSON, President-Elect of the XVth International Ophthalmological Congress in 1937 (Cairo). Professor NORDENSON had replied in the following words:—

3 Grafgatan, Stockholm.
May 9, 1934

Professor DE LAPERSONNE,
Paris.

Dear Professor DE LAPERSONNE,

I beg to thank you for the great honour you have conferred upon me in asking me to become a member of the Committee of the International Association for the Prevention of Blindness, a request which I accept with much pleasure.

J. NORDENSON.

(Warm applause.)

National Committees

Several Members of the Executive Committee have informed us that new Committees have been created and that those already in existence are making good progress; may I mention especially the names of Professor MARQUEZ for Spain, of Professor VAN DUYSE for Belgium, of Professor VAN DER HOEVE for the Netherlands, of Mr. CRIDLAND for Great Britain.

Commission for the Classification of the Causes of Blindness

It will be recalled that this Commission was appointed last year at Madrid, as the result of the discussion which took place at this important meeting.

The difficulties in arranging a meeting of the Members of this Commission obliged the Secretariat to wait until today; meanwhile a copy of the account of the Madrid meeting, together with the reports and documents received since that date, have been forwarded to the Members of the Commission and of the Executive Committee.

After an exchange of opinions between the Members present at the meeting it was decided that in order to co-ordinate the very interesting but rather divergent proposals which had been submitted, it would be advisable to designate a reporter who would give an account of the different opinions, examine at leisure and impartially the problems raised and submit a series of resolutions which would be discussed at the meeting of the General Assembly in 1935. This report would be forwarded to all the Members of the Association several months before the General Assembly.

To give a universal sanction to this Classification Mr. LEWIS CARRIS had suggested that the resolutions adopted by our Association for the Prevention of Blindness might be submitted for approval to the International Ophthalmological Congress in 1937.

On the proposal of Professor MARQUEZ and Dr. MARX the Committee appointed Professor VAN DUYSE as general reporter; his great scientific authority and his critical mind pointed him out for this task and one could rest assured that his report would afford a very safe basis for the debates.

Professor VAN DUYSE thanked the Committee for this token of confidence; he would do his best to deserve it. (Applause.)

Finally, the Chairman asked the Committee's opinion on the seat and date of the next General Assembly. It would be desirable that the time should coincide with the meeting of a Public Health or an Ophthalmological Congress. The Association had had the benefit of the hospitality of the French Ophthalmological Society

Society at its annual meeting. One could not be too thankful to the Committee of this powerful organization and especially to its distinguished Secretary General, Dr. ONFRAY.

As the result of an exchange of opinions, in which Rome, Geneva and London were mentioned, it was decided that the Secretariat would enter into correspondence with Mr. BISHOP HARMAN to select the date and seat of the Assembly for 1935.

During the sitting Dr. PARK LEWIS, on behalf of the American Ophthalmological Society, presented the Dana Medal to Professor DE LAPERSONNE.

ABSTRACTS

I.—OPERATIONS

(1) **Pischel, Dohrmann, K. (San Francisco).—Comparative end-results in the intra-capsular and extra-capsular operations for the removal of senile cataracts.** *Amer. Jl. of Ophthal.*, Vol. XVII, No. 4, p. 326, April, 1934.

(1) **Pischel** makes the introductory remark that his paper "does not lend itself to brief review." It is an interesting piece of work carried out conscientiously and without apparent prejudice on the vexed question of the respective merits of the so-called intra-capsular and extra-capsular cataract operations.

His investigations have been made on patients attending Professor Meller's clinic in Vienna. In the intra-capsular extractions the cases were "selected" and only those absolutely successful, in which there was no loss of vitreous, no rupture of the capsule during extraction and in which no criticism of poor technique or poor judgment could be made were studied. Fifty-seven patients in this series were studied.

In the extra-capsular series no selection was made and none was excluded which exhibited any complication at the time of operation or subsequently. Fifty-eight of these were examined.

The conditions of examination were identical as regards illumination of test types and other factors that might influence subjective testing for all patients.

The author's statistics of the visual results and complications are worth studying.

On the whole the visual results of the "unselected" group of extra-capsular extractions were better than the "selected" intra-capsular group. In the intra-capsular group the anterior chamber was restored more slowly than in the extra-capsular

cases, in some instances taking from 4-14 days and sometimes disappearing after restoration. When posterior synechiae occurred they were more extensive than those complicating the extra-capsular operation. Fine pigment deposits were sometimes seen on the posterior surface of the cornea but this was not observed in the extra-capsular group. On the whole the eye became white sooner after the intra-capsular operation than the extra-capsular extraction. Simple opening of the wound was a more frequent complication in the extra-capsular group than in the intra-capsular cases. For this the author offers the explanation that the conjunctival flap was sutured in the latter and not in the former.

It is worthy of note that only 6·9 per cent. of the extra-capsular cases required subsequent capsulotomy. The author attributes this to the fact that in performing this operation a large piece of the anterior capsule was seized by capsule forceps and thereby capsular epithelial metaplasia into fibrous tissue secondary cataract was prevented.

He concludes by stating that " while the results of the successful intra-capsular operation are practically as good as those in the well performed extra-capsular operations, there were more bad results even in a selected series of cases of intra-capsular operations than in an unselected series of extra-capsular operations."

H. B. STALLARD.

(2) **Castroviejo, Ramon (New York).—Keratoplasty. An historical and experimental study, including a new method.** *Amer. Jl. of Ophthal.*, Vol. XVI, No. 9, p. 825, and continued p. 905, 1933.

(2) **Castroviejo** gives an historical survey of the attempts made to perform keratoplasty from 1840 to the present day. Among many workers in this field the contributions of von Hippel and Elschnig are especially mentioned and the results of their experiments have led to the adoption of a technique similar in its main principles to that advocated by Tudor Thomas in Great Britain.

A variety of methods of cutting corneal grafts and of retaining these in place are described.

More favourable results are obtained by autoplasty and homoplasty, the graft being cut from the other eye of the patient if it is blind (autoplasty), or taken from a suitable donor in whom an excision is necessary or immediately on death (homoplasty). Heteroplastic grafts taken from the eyes of another species of animal all became opaque.

A trephine 4-5 mm. in diameter is recommended for preparing the graft and its bed. The deeper layers of the cornea should be cut in a shelving manner so that the graft does not sink into the anterior chamber. Tudor Thomas advocates a graft slightly

smaller than its bed. The use of forceps, knives and scissors damages the graft and leads to opacity. Some authorities recommend keeping the graft in warm physiological saline before implanting it in its bed; Elschnig prefers to keep it between layers of dry gauze; Tudor Thomas floats it in a watch glass of sterile olive oil.

A number of methods of retaining the graft in its bed are mentioned, the best of these are Elschnig's mattress retention suture running from the limbus between "12 and 6 o'clock" and traversing the surface of the graft, and Tudor Thomas' cross stitching in the cornea adjacent to the graft.

In von Hippel's method of grafting the pupil is contracted by a miotic, whilst Tudor Thomas employs mydriasis.

Adhesion of the iris to the graft causes it to become opaque. Defective coaptation of the edges of the graft also leads to this complication.

"Circumscribed penetrating keratoplasty," a term used in the author's classification, is the method advocated in cases where keratoplasty is justified. Total keratoplasty has been attended by disasters such as opacification, secondary glaucoma, panophthalmitis and phthisis bulbi.

Partial superficial keratoplasty is seldom indicated as optical iridectomy can be employed in many cases of corneal scars affecting localized areas of the superficial lamellae.

The author's criticisms of Elschnig's technique are as follows: The trephine cut is made vertically through the cornea and there is a tendency for the graft to fall into the anterior chamber; the mattress retaining suture does not exert even pressure on the graft and tends to become caught under the lips of the graft which it dislodges. With miosis there is a danger of incarceration of the iris and subsequent opacification of the graft. The author comments on the fact that Elschnig's best results occurred in cases of interstitial keratitis on account of the good vascular supply in the adjacent cornea and were bad in cases of dense leucomata following burns.

The author passes on to describe his own technique. He has fashioned a special instrument by cutting two strips from the edges of a safety razor blade and fixing these in a clamp 4 mm. apart. The instrument is used for making two incisions in the cornea 7 mm. long, 4 mm. apart and exactly parallel to each other in a vertical direction and over the pupillary area cutting through two-thirds of the depth of the cornea.

At the upper limit of these incisions a narrow-edged bent knife is introduced at an angle of 45 degrees. The blade of the knife is 13 mm. long, 4 mm. broad and the edges are sharp for 6 mm. from its point, the remaining 7 mm. being dull-edged. This

instrument is passed obliquely through the cornea above and on entering the anterior chamber the point is brought parallel to the plane of the iris and kept close to the back of the cornea, the counter puncture being made obliquely through the cornea and emerging at the lower extremity of the parallel incisions.

Next a curved spatula with one cutting edge is introduced into the anterior chamber from the upper to the lower limits of the graft in the same track as the bent knife described above. The cutting edge of the spatula is turned obliquely and cuts through the deepest one-third of the cornea in the line of the vertical parallel cuts, but made so that this deepest one-third of the cornea is shelving towards the anterior chamber.

The graft which is now completed is left in position in the donor's eye. The recipient's eye is first prepared by undermining two conjunctival flaps, incisions being made at the limbus above and below from "10.30 to 2.30 o'clock" and "8.30 to 3.30 o'clock" respectively. These flaps are fashioned so that they can be brought together with sutures over the centre of the cornea. They afford even pressure on the graft and ensure its retention. Later, after the sutures have been removed the edges of these flaps become adherent to the upper and lower limits of the graft and afford it nutrition through their vascular supply.

The author recommends that the graft should be transplanted with the minimum delay so as to avoid coagulation of the albumin in the aqueous, a complication he regards as undesirable.

The pupil is dilated with atropine before the operation and this mydriatic is again instilled before applying a dressing. The lids were sutured together in the animal experiments performed by the author.

Post-operative treatment consists in removing the lid sutures 48 hours after operation, gentle irrigation with 1 in 5,000 oxycyanide of mercury. Atropine is instilled. On the fourth day after operation the conjunctival flap sutures are removed.

This work was done with the normal corneae of experimental animals. Ninety-five per cent. of the grafts healed which the author claims is a higher number than by any other method employed. Thirty-five per cent. were successful clinically and subsequently proved to be so on histological examination.

H. B. STALLARD.

(3) **Mayou, Stephen (London).—Discussion on the surgical treatment of unusual forms of squint and hyperphoria.** *Lancet*, April, 21, 1934.

(3) **Mayou** opened this discussion and dealt chiefly with hyperphoria. No ophthalmic surgeon had many cases of the rarer forms of squint and as the results were not generally known

there was a natural hesitation to operate at all. In operating for hyperphoria he used the old method of tenectomy with advancement and he did not separate the tendons from Tenon's capsule. He used Japanese fishing gut because it was soft and easy to pull through. The opposing muscles should be tenotomized in every case, (1) to increase the effect; (2) to lessen the traction on the sutures. When the patient was not under an anaesthetic the result was controlled by a light, set in the ceiling. The eyes were bandaged for seven days to ensure complete rest for the muscles.

ERNEST THOMSON.

(4) **Peter, Luther C. (Philadelphia).—The treatment of non-paralytic squint.** *Amer. Jl. of Ophthal.*, Vol. XVI, p. 681, 1933. *Oxford Ophthal. Congr.*, 1932. *Trans. Ophthal. Soc.*, Vol. LII, p. 325, 1932.

(4) **Peter** classifies concomitant strabismus into convergent and divergent and subdivides these groups into uni-lateral and alternating. He discusses such aetiological factors as defective fusion faculty, refractive errors, hereditary and precipitating causes. The two barriers to cure are absence of the fusion faculty and central amblyopia. The author believes that all phases of treatment yield the best results before six years of age. He has noted that glasses effect the maximum degree of correction in one month in a child, aged 2 or 3 years, and that they may convert a unilateral squint into the alternating type. Amblyopia develops quickly but rarely, if ever, after the seventh year. Glasses may lessen the danger of amblyopia. The author recommends atropinization or occlusion of the fixing eye for children under 7 years of age in whom the squint does not exceed 20°. The occlusion should be for 3-6 hours daily, and it is of greater value when employed for near work than when at play. If there is no amblyopia he recommends occlusion of the fixing eye for two hours daily.

If the second order of fusion is present there is no harm in postponing training until the fourth year or later.

The author recommends early operation if the squint is 30 degrees or more. In cases where the internal rectus is not in contraction it is better to shorten the external rectus. There is a danger of weak convergence if recession of more than 5 mm. is done. In cases of organic contracture of the internal rectus recession is advised.

The author advocates that when two operations are necessary and amblyopia is absent or can be corrected, that double advancements are better than an advancement and recession. He advises resection of the external rectus for squints of 12 degrees to 15

degrees; advancement for 20 degrees; and an advancement and some supplementary operation for more than 20 degrees of squint. He alleges that experience and judgment cannot be replaced by measures and calipers.

He states, in regard to stereoscopic training, that if the fusion faculty is capable of function it responds promptly and with little artificial stimulation. Small degrees of residual squint after operation can be diminished by fusion training aided by prisms base out. The external rectus should be exercised against prisms base in.

In alternating strabismus there is little hope of correcting deviation, fusion is totally absent and training need not be practised and amblyopia does not occur. Operation is recommended and diplopia need not be feared after this.

In cases of divergent concomitant strabismus the author states that amblyopia is rare and that fusion is better than in convergent concomitant strabismus. Full restoration of fusion rarely makes any marked impression on the deviation and few cases can be fully corrected without resort to surgery followed by stereoscopic training. Recession of the external rectus by itself is of little value and some form of muscle shortening of the internal rectus may be necessary in addition.

H. B. STALLARD.

(5) **Curdy, R. J. (Kansas City).—The recession operation for strabismus.** *Amer. Jl. of Ophthal.*, Vol. XVI, p. 891, October, 1933.

(5) Curdy describes a method of performing recession of the internal rectus muscle. The muscle is exposed through a horizontal conjunctival incision; a suture is passed through the upper cut edge of the conjunctiva at the proposed site of recession and then through the upper edge of the tendon about 1·5 mm. from its intersection. The tendon is now divided and allowed to retract 3-5 mm. as required. Great care is taken not to traumatize Tenon's capsule more than is necessary to effect the retraction of the muscle to the desired site. The suture is now passed vertically through the episcleral tissues at the site selected for recession and is then brought through the tendon again near its lower border and thence out through the lower edge of the divided conjunctiva. The horizontal conjunctival incision is closed by tying this suture and inserting any other that may be necessary.

The author favours the horizontal conjunctival incision and states that sepsis around the recession sutures and disfiguring scars are less likely to occur when this is used. He stresses the importance of minimizing trauma to Tenon's capsule. This

operation alone is not advised for cases in which more than 20° of deviation exist. The recession is limited to the anterior segment of the globe in front of the equator.

H. B. STALLARD.

(6) **Veil, Prosper and Felgines (Paris).—The obliteration of retinal tears by the galvano-cautery. (L'obliteration des déchirures rétiniennes par le galvano-cautère).** *Arch. d'Ophtal.*, March, 1934.

(6) **Veil** and **Felgines** seem to prefer the method of diathermo-coagulation in most cases although they give credit to other methods of healing a retinal tear. They say it causes less destruction of tissue. It allows of easy ophthalmoscopic control in the course of the operation although on the other hand we do not yet know whether the cicatrices left after the use of the high frequency current are as solid as those of the galvano-cautery. The methods employed by some of the various writers on the subject, notably Vogt, Fischer and Veil himself are given.

ERNEST THOMSON.

(7) **Bietti (Naples).—Cauterisation by carbon dioxide snow in detachment of the retina. (Cauterizzazioni episclerali come mezzo di terapia nel distacco retinico).** *Boll. d'Ocul.*, May, 1934.

(7) **Bietti** suggests the use of carbon-dioxide snow as a cauterizing agent to produce the necessary choroido-retinitis for re-attachment of the retina. He claims that this form of cauterization is followed by very little disturbance and can be dosed and repeated, if necessary, with very little discomfort to the patient. The results of his first series of cases seem to be satisfactory. The freezing mixture (carbon dioxide snow and acetone) is contained in a special holder and to this are attached metal points of various forms as the case requires. The sclera is laid bare and the point applied to the surface for some 30 seconds in a number of places surrounding the position of the tear. The point generally adheres to the surface, being frozen to it, and requires a little effort to detach. Finally, the subretinal fluid is evacuated by a scleral puncture made either with Graefe's knife or a trephine. The author keeps the patient bandaged for some three weeks and then limits the movements of the eye by stenopaic goggles. He gives only one word of warning which is to avoid touching the skin, conjunctiva, or ocular muscles with the cold point.

HAROLD GRIMSDALE.

II.—MISCELLANEOUS

(1) **Galante (Palermo).—Experimental corneal grafts. (Ricerche sperimentali sugli innesti di cornea. Eteroinnesti).** *Ann. di Ottal.*, February, 1934.

(1) Corneal grafts may be taken from the same individual, from a member of the same species or from a different species. It is generally held that the last form of graft never retains transparency even though it remains attached, but Galante claims to have successfully transplanted rabbit's corneae on to dogs and *vice versa*, the grafts in a number of cases allowing a good view of the fundus, and seeming to the naked eye, completely transparent.

The author's method of operation is to take a disc of 5 mm. diameter and to place it in a gap cut with the same trephine in the cornea of the recipient; the pupil is kept fully dilated. A 3 per cent. solution of peptone sterilized by boiling is injected close to the corneal limbus; no stitches are used. The author has noted that the engrafted disc at first shows some opacity which clears after five or six days, but after two or three weeks a secondary opacity comes on which does not always clear; he regards this as the indication of resentment of the recipient eye to the foreign tissue implanted; he thinks that the injection of peptone acts to limit this adverse reaction. If it is possible to control the resentment of the recipient, the success of heteronymous grafts is made much more probable.

"I consider," says the author, "that there can be no possibility of complete and certain success with 'foreign' grafts, unless there can be found means of neutralizing the natural repulsion of the donor and recipient, and encouraging those characteristics which favour the assimilation of the structures artificially inserted... These fundamental conditions can be found by a close study not only of the morphology, but also of the chemical, physical and biological property of the parties concerned."

HAROLD GRIMSDALE.

(2) **Cavina.—The present state of surgery of the pituitary body. (Lo stato attuale della chirurgia ipofisaria).** *Riv. Oto-Neuro-Oftal.*, May-June, 1932.

(2) In this, and in the following numbers of the same review, the position of the surgery of the pituitary body is discussed; the discussion is opened by Cavina in a long and interesting paper. To the purely ophthalmic surgeon, the question is one chiefly of diagnosis since he will not usually go further than to advise consultation with a surgeon. But his part is of grave importance

since the early signs of this condition often come under his notice first.

The signs of the disease may be considered in three groups; the symptoms dependent on interference at the base of the brain with nervous structures, usually connected with the disturbance of function of the optic nerves; the disturbances of general nutrition, owing to the interference with the normal functioning of the pituitary; and the local changes in the skull due to the overgrowth of the gland and shown by the radiograms, as changes in the sella turcica and sphenoidal sinus. The author draws attention to the importance of the colour fields in the investigation of the patient; losses in the colour fields often precede changes in the fields for white.

The author points out that it is often possible, by the attentive study of the radiogram, to gain information about the probable nature of the tumour and its future development.

It is a well-established fact that endosellar tumours tend to invade the sphenoidal cells until finally the bony wall between the sella and the sphenoidal sinus gives way and the tumour protrudes as a hernia into the cavity of the sphenoid. The dorsum sellae is thinned and eventually appears to slope forward; the anterior clinoid processes remain for long normal in appearance, but as the cavity of the sella extends they seem slightly elevated. Most endosellar tumours are adenomata, and non-malignant.

The supra-sellar tumours alter the sella differently; the cavity becomes bowl-shaped; the dorsum is shortened and thinned, the clinoid processes shortened and pointed. When the tumours are large before they are discovered they have commonly caused so much destruction of the bones that their exact place of origin is a matter of doubt.

The majority of these tumours are not malignant; their removal is often followed by complete recovery, if the destructive process has not advanced too far. The author prefers operation through the nose, although this route is necessarily not aseptic. If surgical treament is not accepted, the use of X-rays and radium offers some hope of alleviation.

In the following number of the same review, the subject raised by the author is discussed from various angles by several surgeons.

Palumbo talks of the treatment by radium and X-rays. He states that acromegaly, gigantism and adenomata are favourably influenced by X-rays. When this is unsuccessful, he advises the application of radium in the cavity of the sphenoidal sinus after opening this.

Boschi and Campailla publish the case of a man in whom a tumour of the pituitary caused obstruction of the cavernous sinus, with exophthalmos, and congestion of the conjunctiva and lids. This was entirely relieved by the use of X-rays.

Mascherpa describes a new apparatus for ensuring a satisfactory radiogram of the sella turcica, and discusses the diagnostic importance of early change in the sella.

HAROLD GRIMSDALE.

(4) **Bickerton, J. Myles.—The menace of hereditary blindness.** *The Brit. Med. Jl.*, January 20, 1934.

(4) After quoting the figures showing the rise in recent years in the number of registered blind of the United Kingdom, **Bickerton** suggests that the total figure for our blind population may be as high as 250,000. Rough figures of the causation of the blindness are given, and he gives 44 per cent. as the figure of largely avoidable incidence. After reviewing the more obviously preventable conditions, including venereal disease, he passes to the genetic types of blindness. Starting with myopia, he gives a summary of the many hereditary diseases of the eye together with illustrative pedigrees from many sources. To prevent much blindness by improving environment and heredity he suggests, among others, the following available means:—

1. Constructive birth control to avoid over-crowding and poverty.
2. Sterilization of mental defectives.
3. Review of the obsolete and ancient abortion laws which now act deleteriously and dysgenetically.
4. Euthanasia for infants with gross defects to be available for parents who wish to make use of it.
5. The Wassermann reaction to be examined during or before pregnancy.

R. C. DAVENPORT.

BOOK NOTICES

A brief history of the Massachusetts Eye and Ear Infirmary and of the Howe Laboratory of Ophthalmology. Privately printed. Boston. 1933.

The Massachusetts Eye and Ear Infirmary was founded by Dr. Edward Reynolds and Dr. John Jeffries in 1824, and is the second oldest institution of its kind in the United States. This brief history contains an account of its modest origin and its progress to the Institution which today has 231 beds and treated, in the year 1932, 7,596 in-patients and 99,646 out-patients. A description of its benefactors, in particular Dr. Lucien Howe, and of the careers of the surgeons who have served on the staff of the hospital from 1824 is given.

Twentieth Annual Report of the Ophthalmic Section, 1932. Department of Public Health, Egypt. Government Press, Cairo.

There are now 22 permanent ophthalmic hospitals, 14 travelling hospitals under canvas, and 16 ophthalmic departments attached to general hospitals. The total expenditure was about £77,000 during the year.

The number of new patients seen was 714,551. The number of operations was 242,365.

The percentage of blind patients, excluding cataract cases was 6·5 of all cases examined. This is a very marked reduction, since in 1909 the percentage of blind patients was 15·6. The definition of blindness is that proposed by Trousseau, that is to say, inability to count fingers held up at a distance of one metre.

The number of operations for senile cataract was 1,518, and for glaucoma 1,145. It is interesting to note that 3,392 lacrimal sacs were excised during the year, while the colossal number of operations for trichiasis-entropion was 73,340.

Great credit is due to the Department of Public Health for the provision of annual increments for ophthalmic purposes, and for continuing publication of the important statistics which are contained in this report.

CORRESPONDENCE

OCULAR TORTICOLLIS

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIR,—I have not had the advantage of reading Mr. McMullen's paper in full, but only the abstract published in the Journal of May, 1934. It contains, however, several statements which I should like to traverse. He kindly refers to my paper in the *Brit. Med. Jl.* of May 4, 1934, but does not appear to have accepted the suggestions I have made therein as to the aetiology, behaviour and course of ocular torticollis. He has "difficulty in accepting the hypothesis" that paralysis of the superior oblique is the commonest cause, as is "stated by most writers;" yet he says that "it appears to be the most reasonable explanation in a majority of cases."

It would be idle to deny that superior oblique paralysis may occur, or, indeed, paralysis of any muscle. In this case the complementary muscle is the inferior rectus of the other eye; and we should get compensatory overaction of this rectus and a downward shoot of this eye when looking away from the side of the eye

with the weak superior oblique; and tenotomy of this inferior rectus would be indicated if head tilting had arisen. I have not met with this condition, though it may occur. I am satisfied, however, from my own observation that the syndrome described by Duane in the *Arch. of Ophthal.*, 1916, is a relatively frequent one. This is an overaction of the inferior oblique, and upshoot of the right eye when looking to the left, or vice versa, and due to an initial paresis of the superior rectus of the other eye.

Mr. McMullen says that, as it has a tendency to spontaneous improvement, it is inadvisable to operate on children. As it is a congenital condition I do not see how any spontaneous improvement can be expected to occur, nor have I seen it. And in such a complex co-ordinated movement it is difficult to see what good could be expected from exercises or prisms. The reason that not many adult head-tilters are seen, though I have met with a few (a prominent Sydney physician is a typical instance of this syndrome), is, as I pointed out in my paper, that the majority avoid the diplopia, not by inclining the head, but by developing a squint with suppression. And in any large children's eye clinic quite a fair percentage of convergent squints will be found to have overaction of the inferior oblique if this is looked for by appropriate movements; which, while it does not prove, at least supports my thesis.

Myotomy of the inferior oblique at its origin is not at all difficult, once the technique is acquired. And I can assure Mr. McMullen that his fear of the muscle slipping back too far does not seem to be justified by experience. In fact, to make sure of the effect I always excise a small piece of the muscle, which is always much more bulky than one would expect.

The issues seem to me to be simple. To ascertain which muscle is weak, in my own experience, it has almost invariably been the superior rectus; then to deal, not with this tendon, which would be futile, nor with its antagonist in the same eye, which would lead to derangements in the primary position, but with the complementary muscle in the other eye, which has developed compensatory overaction.

I am not here referring to simple cases of hyperphoria or hypertropia, in which headache, not head-tilting, has arisen. In these, where prisms are not corrective, advancement of the tendon of the offending muscle may be the correct procedure.

Yours truly,

E. TEMPLE SMITH.

SYDNEY,
May 22, 1934.

OBITUARY

MARMADUKE STEPHEN MAYOU

IT was with deep regret that we briefly recorded last month the death of Stephen Mayou on July 20. By this untimely event, the Ophthalmological Society has lost its President, and ophthalmology in general, one of its most outstanding men.

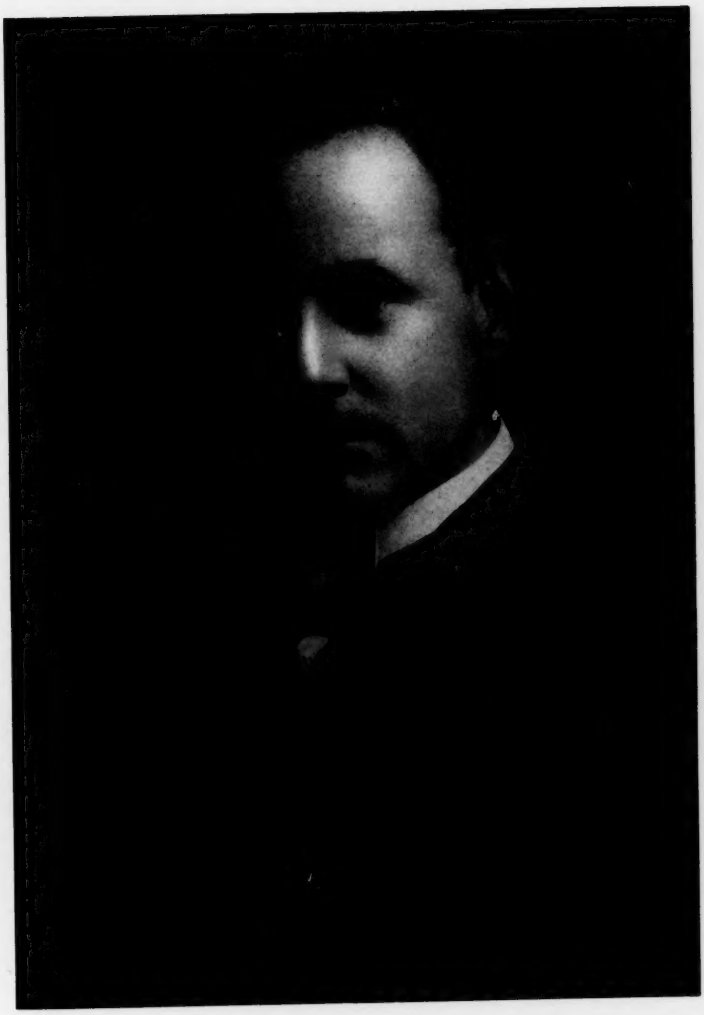
Marmaduke Stephen Mayou was born at Monmouth, in May, 1876, and came of a medical family, his father being George Mayou, M.D. His medical education was received at King's College, and the London Hospitals, as a student he won the Warneford Scholarship and Jelf Medal. He qualified M.R.C.S., L.R.C.P. at the early age of 21 years, and four years later obtained the F.R.C.S. England, thus laying the foundation of a brilliant scientific career.

Though Mayou's activities in ophthalmology were of the widest, he probably will be remembered best for his work on the conjunctiva. His interest in this subject was shown early in his career, and in 1904 he was awarded the Jacksonian prize for his essay on "Conjunctivitis: Its Pathology, Varieties and Treatment." In 1905 he held the Hunterian Professorship of the Royal College of Surgeons, taking as the subject of his lecture "The Changes Produced by Inflammation in the Conjunctiva;" while in 1918, when the London County Council decided to establish St. Margaret's Hospital for the treatment of ophthalmia neonatorum, he was appointed as its Consulting Surgeon. The work he did here was of incalculable value; from the point of view of treating the patients, of teaching the medical students and midwives who attended for training, and of establishing the fact that with proper care and precautions, an attack of ophthalmia neonatorum need not cause any permanent impairment of vision.

Somewhat similar in nature was his work at White Oak, where, in 1927, he followed the late Mr. Treacher Collins as Visiting Ophthalmic Surgeon. This hospital, primarily founded for the treatment of trachoma, was also used in later years for cases of interstitial keratitis, chronic conjunctival and corneal disease, and abundantly justified its purpose.

Mayou's work was not limited to the conjunctiva, and he realised early in his career the important part that a proper understanding of pathology plays in the education of an ophthalmologist.

Most men would have been satisfied, when they obtained the post of pathologist and radiographer to an eye hospital, to have published a few desultory papers on the specimens which came their way, but this was not the case with Mayou. His zeal and



MARMADUKE STEPHEN MAYOU—1876-1934

UNIV. OF MICH.

energy led him in 1911 to produce, in collaboration with Treacher Collins, a much valued book on the pathology and bacteriology of the eye, which is familiar to all English speaking ophthalmologists. A second enlarged edition of this work was published in 1924.

Mayou also catered for the undergraduate student of ophthalmology, and the small handbook he wrote on diseases of the eye, obtained a well deserved popularity and is now in its fourth edition. In preparing this volume, he had a wealth of clinical material on which to draw, for, in addition to holding the post of Senior Surgeon to the Central London Ophthalmic Hospital, he was also Ophthalmic Surgeon to the Bolingbroke Hospital at Wandsworth.

Almost every branch of human ophthalmology was covered by his writings, but even this did not exhaust Mayou's capacity for work, and quite recently there appeared in this journal, an article from his pen, on the subject of retinal visual cells in man and freshwater fish.

Those who were privileged to work with Mayou at the Central London Ophthalmic Hospital will realise what the untiring devotion of one man can mean to an institution. He took the keenest interest in all phases of its development, and it was due to his initiative that the hospital possesses a remarkably fine set of private wards under the name of the Princess Marie Louise Wing. Every item of their equipment, furniture and design was a matter of personal interest to him, and the same is true of the recently completed squint training department.

Mayou's association with this journal was a close one, he contributed many articles to its pages and up to his death was a member of its editorial and executive committee. He served also on another executive committee, namely that of the Council of British Ophthalmologists, of which he was Honorary Treasurer. His presence here was valuable especially as a liaison officer between that body and the British Medical Association, since he had represented the latter in 1930 on the National Ophthalmic Treatment Board. He served also on the Council of the Section of Ophthalmology of the Royal Society of Medicine and was an original member of the Section.

Mayou was a well known figure in Masonry. He was Master of the Captain Coram Lodge and ophthalmic surgeon to the Royal Masonic Hospital, and to the Masonic schools at Weybridge and at Clapham Junction.

In 1933 he was accorded by his fellows the coveted distinction of being elected President of the Ophthalmological Society of the United Kingdom. He was to have held this office for two years and had already done valuable service to the Society when death cut short his career.

That one man should have held so many posts was an undoubted tribute to his character. In committee, his opinions were always definite and founded on sound reason. Should he decide on a course of action, none knew better than he how to carry it through, and with a happy smile on his face, he was always ready to tell his colleagues the right mode of procedure. He had a wonderful knowledge of human nature, and it was this, coupled with his native charm, which made Mayou such a valuable member of any committee. Although he could usually see further than most people, if his views were not accepted, he was quite unruffled and would stand by the decision of his colleagues.

In private practice, he had a host of patients by whom he was regarded with gratitude, esteem and confidence. His profound knowledge and experience were at their service, and his skill in operating was of a high order.

Away from his work, Mayou had many hobbies. He was a keen horticulturist and fisherman and an expert golfer. His country house at Camberley was near the links, and his kind hospitality to those taking part in the ophthalmic inter-hospital golf matches, will be an ever-green memory to those who played in them. As Captain of the Central London Ophthalmic Hospital team he frequently led his side to victory.

No account of Mayou would be complete without an allusion to the valiant fight he put up against ill health during the last five years of his life. Though physically a sick man, his zeal and energy were such that he completely conquered his disabilities. In the intervals between attacks, his zest for work, sport and hospital organization was untiring, and no one meeting him would have realized his handicap.

He was a most genial and generous host, full of humour mixed with a kindly cynicism; a man one respected and loved, but never feared. He had great understanding of human nature, but little patience with inefficiency.

In all his activities, Mayou was staunchly supported by his wife, whose initiative, strength of character and encouragement were of supreme importance in helping him to the achievement of his ambitions. To her and to his three daughters, we extend our deepest sympathy.

NOTES

Appointments

Mr. FRANK LAW has been appointed Ophthalmic Surgeon to Guy's Hospital.

Mr. CHARLES B. V. TAIT, M.B., B.S. (Lond.), D.O.M.S., has been appointed Hon. Consulting Ophthalmic Surgeon to Savernake Hospital.

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Oxford Ophthalmological Congress

AT a recent meeting of the Council the following executive appointments were made for 1935. *Master:* C. G. Russ Wood; *Immediate Past Master:* Cyril H. Walker; *Deputy Master:* Philip H. Adams; *Hon. Secretary and Treasurer:* F. A. Anderson, 12, St. John's Hill, Shrewsbury.

The dates for the next Congress are July 4, 5 and 6, 1935.

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Retirement of Dr. Wilmer

UNDER the regulations of Johns Hopkins University professors automatically retire on reaching the age of 70 years. Dr. William Holland Wilmer, having achieved the psalmist's span of years, thus ceases to be the Director of the Wilmer Ophthalmological Institute. But he is not content, we understand, to rest upon his laurels and retire to a well earned *otium cum dignitate.* In giving up his Professorship he intends to revert to private practice. He will also continue to lecture at Georgetown University and to work at the Episcopal Eye, Ear and Throat Hospital, Washington D. C. In retiring from the Institution, which bears his name, Dr. Wilmer will carry with him the regrets of all in any way connected with the Wilmer Institute as well as heartiest good wishes for future health and happiness. Much has he accomplished in the past. That the future may be equally prolific is, we feel sure, the heartfelt wish of all his friends on both sides of the Atlantic.

FUTURE ARRANGEMENTS

1934

October 2.—Midland Ophthalmological Society, at Birmingham. (Annual Meeting)

October 19.—North of England Ophthalmological Society, at Manchester.

November 16.—North of England Ophthalmological Society, at Bradford.

December 7.—North of England Ophthalmological Society, at Leeds.

1935

February 15.—North of England Ophthalmological Society, at Newcastle-on-Tyne.

March 15.—North of England Ophthalmological Society, at Liverpool.

April 12.—North of England Ophthalmological Society, at Sheffield.

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *July, 1934.*

LLOYD. The scotoma of glaucoma complex.
FARRELL. Gonorrheal ophthalmia.
LUCKIESH and MOSS. A correlation between pupillary area and retinal sensibility.
GRADLE and GIFFORD. Delimiting keratotomy.
MORSE. The electrocautery in the treatment of corneal ulcers.
FERREE and RAND. The testing of visual acuity.
LEINFELDER and SALIT. The lipids of retina, brain, and blood.
ADAMS, *GAMBLE, GIFFORD and GRADLE.* An ophthalmological survey of Illinois State School for the Blind.

Archives of Ophthalmology. *June, 1934.*

SAFAR. Detachment of the retina: its treatment with multiple diathermic puncture and its results.
ADLER. Apparent optic atrophy with recovery of normal central visual acuity.
SEECH. Congenital cyst in the vitreous.
APPLEMAN. Muscle training in functional convergence insufficiencies.
STOKES. Racemose arteriovenous aneurysm of the retina: (Aneurysm racemosum arteriovenosum retinae).
KRAUSE. Chemistry of the vitreous humour.
DIMITRY. Anatomic error in using base of nose as point of rest for spectacles.
MEDING. Free cyst floating in the vitreous.
RONES. The Wilmer iridocapsulectomy.
RAND. Glioma of the retina: report of a case with intra-cranial extension.
FRIEDMAN and WRIGHT. Phthiriasis palpebrarum: report of a case.
SAMUELS. Anatomic and clinical manifestations of necrosis in eighty-four cases of choroidal sarcoma.
PEER. Repair of coloboma of the upper eyelid.

Revue d'Oto-Neuro-Ophtalmologie. *June, 1934.*

TERRACOL. The treatment of acute retrobulbar optic neuritis of sinus origin.
RIMBAUD, VIALLEFONT, ANSELME-MARTIN and LAFON. Papilloedema and arterial hypertension.
VILLARD, VIALLEFONT and BOUZIGUES. Double extrinsic motor paralysis in a diabetic.

Klinische Monatsblätter für Augenheilkunde. *June, 1934.*

RIEHM. Contribution to definition in the theory of allergy. The relation between anaphylaxis and immunity.
VOGT. Cystoid retinal degeneration and the accompanying striation, the optical conditions governing the visibility of the cysts.
JUNIUS. The aetiology of Coats' exudative retinitis.
SHAPIRA. The aspirating method for extraction of soft cataract.
GUALDI. New corneal contact glasses for the correction of ametropia.
SEMADENI. Fractional iris irradiation of rabbits' eyes. With remarks on Goldmannschen's iris burn and his alleged heat cataract.
DERKAC. Persistent tissue infiltration in trachoma.
MOTEGI. Ophthalmological observations on 100 cases of malarial disease.

July, 1934.

LINDNER. Blaskovic's ptosis operation.
THIEL. Sunflower cataract in hepato-lenticular degeneration. (Pseudosclerosis).
SCHMIDT. Clinical investigation on the connection between dental and ophthalmic disorders.
VOGELSANG. The globular measurement of the eye.
LATTE. The significance of the physiological and pathological lines on the posterior corneal surface.
KOYANAGI. A case of tuberculous panophthalmitis with special regard to its primary localisation.
ARRUGA. On the origin of the retinal tear and idiopathic retinal detachment.
VON RÖTTH. Experimental model of retinal detachment.
ARRUGA. On the immobility of the eyeball in the treatment of retinal detachment.
BIETTI. Further contributions to the knowledge of retro-lenticular pigment rings, and their mode of development.
HAMBURGER. Ten years of glaucoma treatment.
KRAUPA. The development of proliferating vessels into the vitreous humour with senile phenomena of the retinal vessels.
STREUEL. Local and general treatment for sympathetic ophthalmitis. A new method for the experimental production and the study of sympathetic ophthalmitis.
MAJOROS. The employment of pituitary posterior lobe hormones in local anaesthesia.

Annali di Ottalmologia e Clinica Oculistica. *May, 1934.*

RUSSO. Argyrosis of the cornea. Biomicroscopical study.
CAMPOS. Closing of the retina with multiple diathermic puncture. Histological research.
BRACCI-TORSI. On the immunizing power of the aqueous and its various proteins in the normal condition of the eye.
SPADAVECCHIA. Epidemic encephalitis and its ocular manifestations.

June, 1934.

SANTONASTASO. On the relation between cholesterin and blood calcium in degenerative ocular affections.
SPADAVECCHIA Epidemic encephalitis and its ocular manifestations.
VILLANI. Condition of the ciliary muscles in atrophy of the globe.
RINALDI. Glaucosan in the treatment of some ocular affections with hypertension.

Archivio di Ottalmologia. *March, 1934.*

FAVALORO. Contribution to the knowledge of the senile syndromes of the fundus.
FERRARI. Epithelial xerosis of the tarsal conjunctiva.
——— The value of sulphur treatment in some ophthalmic conditions with particular regard to non-luetic forms.
MAZZI. Bilateral facial coloboma with oculo-palpabral adherence and ocular complications.

Bollettino d'Oculistica. *May, 1934.*

PANICO. Concomitant strabismus and facial asymmetry.
SGROSSO. The pathogenesis of traumatic ocular lesions in relation to Frenkel's traumatic syndrome of the anterior segment.
CARAMAZZA. The aetiology of keratoconus and the use of contact glasses.
BIETTI. Episcleral cauterization by carbon dioxide snow as a means of treatment in retinal detachment.
PETRAGNANI. Investigation on "elective sensibility" of the eye.
DE CRISTOFARO. Contribution to the knowledge of spontaneous cysts of the iris
MORELLI. Lymphoid hypertrophy of the conjunctiva with ectasia of the lymphatic vessels.
LUSTIG. Effects of war gas on the eyes.

July, 1934.

PANICO. Biomicroscopy of ocular tumours.
BENCINI. Diathermy coagulation in the cure of retinal detachment.
CARAMAZZA. Voluminous angiomata of the upper lid treated with surgical diathermy.
MORELLI. End results of iontophoresis in arsenobenzol treatment of the eye.
ALIQUÒ-MAZZEI. Clinical contribution, anatomo-pathological and histochemical to the knowledge of xanthomatosis bulbi.
PETRAGNANI. Lacarrère's myocampter in the surgical cure of strabismus.
BATIGNANI. Ophthalmoplegic zoster.

Rassegna Italiana d'Ottalmologia. *March-April, 1934.*

GALANTE. The action of the ultra-violet rays on corneal affections and wounds.
GALEAZZI. Cholesterinemia and cataract.
TRISTAINO. Arterial pressure, intra-ocular tension and their relation to glaucoma.
VILLANI. Second contribution to Vossius' cataract.
BIETTI. On the pathological anatomy of corneal degeneration of speckled type. (Fehr).
JONA. Experimental research on the behaviour of the conjunctival secretion and of the bacteriological flora after a bandage for 24 hours.
MOSSA. Experimental and histological research on retinitis proliferans.

Revista Oto-Neuro-Oftalmologica e Radio-Neuro Chirurgica.

May-June, 1934.

CARAMAZZA. The condition of the retina and of the optic nerve in some anencephalic monsters.
VERCELLI. Extrinsic mesencephalia from an occipital neoplasm. (Polymorphous spongioblastoma.)
TORRINI. Anisocoria in inflammatory auricular lesions.
NEUSCHULER. Complete bilateral ophthalmoplegia externa from rachitic anaesthesia.

Revista Oto-Neuro-Oftalmologica. *June, 1934.*

SOBOL. Osteoma of the orbit.
PAVIA. The fundus. Capillaritis.
DUSSELDORP. Treatment of spasmodic entropion of the eyelids by the resection of the orbicularis muscle.
CARRERAS. The optic nerve and acetylarsan.